

JUL 02 1999

Transmittal

RCAP

To: Chief, Permits Section

Missouri Department of Natural Resources

Hazardous Waste Program

1738 East Elm Street (Lower Level)

PO Box 176

Jefferson City, MO 65102

Date:

June 28, 1999

File:

3050.005

Re:

Inland Realty Co.

We are sending you:

X_herewith_under separate cover: _drawingsX_descriptive literature_letters

If material received is not as listed, please notify us at once.

Quan.	Identifying Number	Title	Action*
3	May 1999	1998 Annual Ground Water Compliance Monitoring Report	I

*Action letter code:

R-reviewed S-resubmit

N-reviewed and noted

J-rejected

I-for your information

Y-for your approval

Remarks: Enclosed is the first annual compliance monitoring report for the Inland Realty Co. property, Maryville, MO, in compliance with Missouri Hazardous Waste Management Facility Permit No. MOD099238784.

Chief, RCRA Permitting & Compliance Branch, USEPA Region VII (3 copies)

Millard Cohen - Inland Realty (1 copy) Al Macali, Jr. - Laclede Chain Co. (1 copy)

Peter Strasner, Esq. - ThompsonCoburn (1 copy)

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

James R. Myers, PE

Senior Project Engineer



RCRA RECORDS CENTER

REC'D

JUL 02 1999

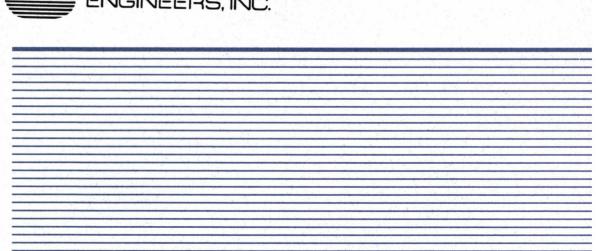
RCAP

1998 Annual Ground Water Compliance Monitoring

Inland Realty Company Maryville, Missouri

May 1999





REPORT

1998 Annual Ground Water Compliance Monitoring

Inland Realty Company Maryville, Missouri

Dean L. Palmer, PE Vice President

May 1999



Suite 211 5000 Cedar Plaza Parkway St. Louis, Missouri 63128

Contents

1.	Introduction	1
	1.1. Site history summary	
	1.2. Monitoring system	
	1.3. Historical ground water sampling	
	1.4. Historical analytical parameters	
2.	Sampling and analyses	5
	2.1. Well sampling procedure	
	2.2. Analytical results	
	2.3. Comparison to post-closure permit ground water protection standards	
	2.4. Extent of impact	
	2.5. Trend graphs	
3.	Ground water level data and calculations	
	3.1. Ground water elevations	3
	3.2. Horizontal ground water migration	5
	3.3. Vertical ground water migration	
4.	Conclusions	ç

List of Tables

2-1.	Ground water analytical results - December 1998	
3-1.	Shallow well ground water elevations, 1997 and 1998 14	
3-2 .	Deep well ground water elevations, 1997 and 1998 14	
3-3.	Site hydraulic gradients (I)	
3-4.	Hydraulic conductivities (K)	
	Ground water velocities	
3-6	Vertical ground water flow notential: 1998 elevation data 18	

List of Figures

- 1 Ground water monitoring well location plan
- 2 Cadmium isoconcentration map shallow wells
- 3 Cyanide isoconcentration map shallow wells
- 4 Manganese isoconcentration map shallow wells
- 5 Nickel isoconcentration map shallow wells
- 6 Manganese isoconcentration map deep wells
- 7 Ground water elevation contour map shallow wells 1st quarter 1998
- 8 Ground water elevation contour map deep wells 1st quarter 1998
- 9 Ground water elevation contour map shallow wells 2nd quarter 1998
- 10 Ground water elevation contour map deep wells 2nd quarter 1998
- 11 Ground water elevation contour map shallow wells 3rd quarter 1998
- 12 Ground water elevation contour map deep wells 3rd quarter 1998
- 13 Ground water elevation contour map shallow wells 4th quarter 1998
- 14 Ground water elevation contour map deep wells 4th quarter 1998

List of Appendices

- A Ground water sampling field logs
- B Laboratory analytical reports
- C Concentration trend graphs 1995-1998
- D Concentration trend graphs 1987-1995

1. Introduction

The purpose of this report is to fulfill the reporting requirements of Missouri Hazardous Waste Management Facility Permit MOD099238784 for the Inland Realty Company site located in Maryville, Missouri. The fourth quarter 1998 ground water sampling event provides the basis for this report. Ground water samples were collected December 8-10, 1998.

1.1. Site history summary

From the early 1970s to October 1981, a surface impoundment (lagoon) owned by Nixdorff-Lloyd Chain Company received spent pickling waste from the production of low-carbon steel chains. The surface impoundment was classified by USEPA and Missouri Department of Natural Resources (MDNR) as a treatment, storage, or disposal (TSD) facility. As such, the lagoon was subject to Resource Conservation and Recovery Act (RCRA) regulation. The pickling operation was discontinued and discharges to the lagoon ceased in October 1981. In November 1984, the lagoon's liquid contents were neutralized and decanted.

The lagoon closure activities began in late 1986 to early 1987 by using lime to stabilize the sludge, placing the sludge at the west end of the former lagoon, and capping the sludge. In 1989, a Notice of Violation (NOV) prompted a decision to cap the entire former lagoon. The lagoon cap was completed in April 1990.

In December 1993, Nixdorff-Krein Industries, parent company of Nixdorff-Lloyd, received concurrent requests from USEPA and MDNR for a Part B post-closure permit application for the former lagoon, which was prepared and submitted to both agencies in May 1994. Signed approval of the post-closure permit application was received in March 1999.

1.2. Monitoring system

Thirteen wells and four piezometers form the ground water monitoring system at the Inland Realty site. The well locations and present identification are shown on Figure 1. Four wells (GMW #1 through GMW #4) were originally installed in 1982 to fulfill RCRA ground water monitoring requirements for a surface impoundment (per 40 CFR 265 Subpart F). GMW #1 was the farthest upgradient well and was located northeast of the former impoundment area. This well was located on property owned by the Missouri Department of Transportation (MODOT), and a large pile of road salt was formerly stored near the well. When the ground water indicator parameters appeared to increase, eight additional wells (GMWs 2D, 4D, 5S, 5D, 6S, 6D, 7, and 8) were installed. Because of the uncertainty of the data obtained from monitoring GMW #1, upgradient background wells GMW #5S and GMW #5D were installed as replacement wells, and GMW #1 was no longer sampled.

In March 1989, a meeting between MDNR and O'Brien & Gere Engineers, Inc. (O'Brien & Gere) resulted in a work plan to upgrade the ground water monitoring system. Improvements were made by installing two new wells (GMW #3S and GMW #3D) approximately 125 to 150 feet downgradient of the former lagoon area. Additionally, four piezometers (PZ-1 through PZ-4) were installed to monitor ground water elevations. In 1990, GMW #9 was installed to replace GMW #8 which had been damaged. GMW #1 and GMW #8 were abandoned in 1991.

The grout surface seals of several wells were formerly covered with an earthen mound. The purpose of the mound was to protect the integrity of the grout seal due to high shrinkage and swelling potential of the native soils and to promote precipitation runoff away from the wells. At the request of MDNR, these well seals were modified in 1990. The earthen mounds were removed and the concrete surface seals were brought to above the existing ground surface to replace the earthen mounds. In December 1991, additional maintenance activities were performed on the monitoring system. PSI, Inc. of Omaha, NE installed a new, reinforced concrete apron over the monitoring wells (except GMW #9).

1.3. Historical ground water sampling

During 1989, the ground water monitoring network activities were in the detection phase of closure activities. Because the results of monitoring well GMW #4 triggered a statistical increase in several analytical parameters, verified by additional ground water sampling and analyses, a ground water quality assessment plan was prepared and submitted to MDNR. Closure activities reverted to the assessment phase. Between the first quarter 1990 through the fourth quarter 1998, the ground water monitoring system has been sampled quarterly.

From 1989 through second quarter 1991, statistical analyses were performed on the laboratory analytical results and field sampling parameters. Starting with third quarter 1991, following communication with MDNR, statistical analyses were no longer performed. To replace the statistical analyses, trend graphs of key parameters and key wells were developed as part of the Annual Ground Water Report. These revisions were in the November 1991 Revised Ground Water Assessment Monitoring Plan and Sampling and Analysis Plan (SAP) which was submitted to MDNR. Revisions were based on correspondence between MDNR and O'Brien & Gere, and the requirements of the SAP were mutually agreed upon.

In addition to a modification of analytical data evaluation, three of the monitoring wells, GMW #6S, GMW #6D and GMW #7, were eliminated from quarterly sampling. The sampling frequency of these wells was decreased to annually and was scheduled to be performed during the second calendar quarter of the year. The November 1991 SAP was further revised in July 1993 and September 1997.

1.4. Historical analytical parameters

Ground water samples collected from GMW #1 through GMW #4 in 1984 were analyzed for RCRA ground water quality parameters. The analyses indicated a statistically significant increase in RCRA parameters downgradient of the former lagoon. Additional monitoring wells were installed, and analytical parameters were revised in 1985 to include pH, specific conductivity, fluoride, nitrate, chloride, dissolved metals (lead, zinc, iron, and chromium), sodium, sulfates, total organic carbon, total organic halides, and volatile halogenated organics. The analytical parameter list was expanded to include dissolved mercury in 1987 and cyanide in 1988. In February 1990, a

revised sampling plan was approved by MDNR. The 1990 sampling plan analytical parameters were cadmium, chromium, lead, mercury, nickel, zinc, cyanide, total organic carbon, sulfates, pH, and specific conductivity. The metals analyses were for both total and dissolved constituents. The sampling plan and parameter listing were revised in the Fall of 1991 at the request of MDNR. The sampling frequency of GMWs 6S, 6D, and 7 was changed to annually, and the requirement for dissolved metals analyses was discontinued. The 1991 revised analytical parameters were cadmium, chromium, lead, iron, mercury, manganese, nickel, zinc, cyanide, sulfates, pH, specific conductivity, and temperature. In 1993, the analytical method for mercury was changed to Method 7470. In 1998, the method detection limits were lowered to 2 parts per billion (ppb) for lead and to 5 ppb for cyanide.

2. Sampling and analyses

2.1. Well sampling procedure

During semi-annual sampling events, ground water monitoring well sampling procedures set forth in the Ground Water Sampling and Analysis Plan (approved in March 1999) were followed. Following is a description of these procedures.

Before the wells were purged, the water level elevations were recorded. In addition, the pH and conductivity meter was calibrated according to the manufacturer's specifications prior to sampling at each well. Using the length of the water column, the quantity of water needed to remove three well volumes was calculated. Dedicated bailers with new lengths of polypropylene rope were used to remove at least three well volumes of ground water from wells that exhibited sufficient recharge. GMW #2S and GMW #4S did not exhibit sufficient recharge to purge three well volumes. pH, specific conductivity, and temperature measurements were collected from the initial bailer of ground water and after removing each well volume. After consistent pH and specific conductivity readings were achieved, a set of ground water samples for laboratory analyses was collected, preserved with analyte-specific acids (where necessary), and cooled with ice in coolers. Ground water samples were delivered to the laboratory by overnight courier. Laboratory samples were analyzed by American Technical and Analytical Services, Inc. (ATAS) of St. Louis, Missouri. One duplicate ground water sample was analyzed by O'Brien & Gere Laboratories, Inc. of Syracuse, New York. Purge water was discharged to the Laclede Chain pretreatment system. The quantities of ground water purged from the wells are shown on the ground water sampling field logs (Appendix A). A total volume of 144 gal was purged from the monitoring wells.

2.2. Analytical results

Table 2-1 summarizes the laboratory analytical results from the December 1998 semi-annual sampling event. Laboratory analytical reports may be found in Appendix B.

Table 2-1. Ground water analytical results - December 1998 (page 1).

		monitoring trons						Post-closure permit
Parameter Units		28	2D	3	38	3D	3DA ¹	ground water protection standards
Cadmium-Total	mg/L	<0.005	<0.005	0.019	<0.005	<0.005	<0.005	0.12
Chromium-Hexava		<0.05	<0.05	< 0.05	<0.05	<0.05	<0.01	0.24
Chromium-Trivaler		NE	NE	NE	NE	NE	NE	49
Lead-Total	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	3
Mercury-Total	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.37
Manganese-Total	mg/L	1.75	0.572	1.01	0.407	0.551	0.53	114
Nickel-Total	mg/L	0.008	< 0.005	< 0.005	0.005	< 0.005	<0.005	10
Zinc-Total	mg/L	< 0.010	< 0.010	0.020	< 0.010	0.013	0.010	1,175
Cyanide-Total	mg/L	0.015	<0.005	<0.005	0.047	<0.005	<0.005	40
pН	S.U.	7.57	6.54	6.67	6.91	6.4	6.4	N/A
Specific m Conductivity	icromhos/ cm	2,820	1,151	1,535	1,875	1,240	1,240	N/A
Temperature	°C	16.4	15.2	15.7	16	13.6	13.6	N/A
		<i>L</i> *						

¹Duplicate of 3D NE - Not estimated (See section 2.3 for explanation.) N/A - Not applicable Source: O'Brien & Gere Engineers, Inc.

Table 2-1. Ground water analytical results - December 1998 (page 2).

			Monitoring Wells					Post-closure permit
Parameter	Units	45	4D	58	5D	9	10²	ground water protection standards
Cadmium-Total	mg/L	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	0.12
Chromium-Hexavalen		0.061	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.24
Chromium-Trivalent	mg/Ļ	NE	NE	NE	NE	NE	NE	49
Lead-Total	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	3
Mercury-Total	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.37
Manganese-Total	mg/L	30.3	1.22	0.259	1.11	0.701	< 0.005	114
Nickel-Total	mg/L	0.431	< 0.005	0.011	< 0.05	< 0.005	< 0.005	10
Zinc-Total	mg/L	1.61	< 0.010	< 0.10	< 0.10	0.013	< 0.010	1,175
Cyanide-Total	mg/L	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	40
pН	S.U.	6.22	6.32	6.53	7.19	6.69		N/A
Specific Conductivity	micromhos/ cm	4,440	1,690	3,120	1,484	1,233		N/A
Temperature	°C	/ 12.8	12.3	14.6	13	14.3		N/A

²Sample of distilled water NE - Not estimated (See section 2.3 for explanation.) N/A - Not applicable Source: O'Brien & Gere Engineers, Inc.

2.3. Comparison to post-closure permit ground water protection standards

The ground water laboratory analytical results obtained from the first semiannual sampling event have been compared to the post-closure permit ground water protection standards (GPS). These standards were developed as part of an exposure assessment that was performed for the site and are included in the post-closure permit.

Reported cadmium concentrations ranged from less than 0.005 mg/L (GMW) #s 2S, 2D, 3S, 3D, 4D, 5S, 5D, and 9) to 0.019 mg/L (GMW #3). The highest reported cadmium concentration was approximately one order of magnitude lower than the ground water protection standard of 0.12 mg/L. Reported hexavalent chromium concentrations were less than 0.05 mg/L for GMW #s 2S, 2D, 3, 3S, 3D, 4D, 5S, 5D, and 9. The detection limit for hexavalent chromium is one order of magnitude higher than that recommended in the closure permit. A review of the five SW846 methodologies for hexavalent chromium analyses and discussions with both ATAS and O'Brien & Gere Laboratories personnel indicate that a method detection limit of 0.005 mg/L is not attainable due to interferences from chlorides and sulfates in the ground water. Also, the detection limit for total chromium is 0.005 mg/L; therefore, the reported concentrations for total chromium are more accurate and will be more consistent. For these reasons, the hexavalent chromium concentration of 0.061 mg/L for GMW #4S may be inaccurate as total chromium was reported at 0.007 mg/L for GMW #4S. As total chromium is equal to hexavalent chromium plus trivalent chromium, it would be unreasonable to have a hexavalent chromium value of 0.061 mg/L as the total chromium concentration is 0.007 mg/L. If the 0.061 mg/L hexavalent chromium value for GMW #4S is accurate, it is approximately four times lower than the ground water protection standard of 0.24 mg/L.

Based on the higher method detection limit for hexavalent chromium than for total chromium, the concentration of trivalent chromium was not calculated. However, the concentrations of trivalent chromium must be less than the concentrations of total chromium, all of which are reported as at least three orders of magnitude less than the 49 mg/L trivalent chromium ground water protection standard.

Lead was not reported above the method detection limit of 0.002 mg/L, which is approximately three orders of magnitude less than the ground water protection standard of 3 mg/L. Mercury was not reported above the 0.0002

mg/L method detection limit, which is approximately three orders of magnitude less than the ground water protection standard of 0.27 mg/L. Reported manganese concentrations ranged from 0.259 mg/L to 30.3 mg/L. The highest reported manganese concentration is approximately one-fourth of the ground water protection standard of 114 mg/L. Reported nickel concentrations ranged from less than 0.005 mg/L to a high of 0.431 mg/L. The highest reported nickel concentration is 2.5 orders of magnitude less than the ground water protection standard of 10 mg/L. Reported cyanide concentrations ranged from less than 0.005 mg/L to 0.047 mg/L. The highest reported cyanide concentration is approximately two orders of magnitude less than the ground water protection standard of 40 mg/L. Reported zinc concentrations ranged from less than 0.010 mg/L to 1.61 mg/L. The highest reported zinc concentration is three orders of magnitude less than the ground water protection standard of 1,175 mg/L.

2.4. Extent of impact

The laboratory reported concentrations for cadmium, cyanide, manganese, and nickel were used to construct isoconcentration maps (Figures 2, 3, 4, and 5, respectively) for the shallow wells. Manganese concentrations were used to construct an isoconcentration map (Figure 6) for the deep wells. The remainder of the data were either all below method detection limits (lead and mercury) or only had one or two data points (chromium and zinc). The isoconcentration maps and the tabulated data indicate that, in general, the highest concentrations (while still below ground water protection standards) tend to be in an area to the east and southeast of the former lagoon approximately bounded by a line through GMWs #2S, #3S, #3D, #3, and #9. Also, concentrations tend to reduce with depth, as supported by cadmium, manganese, nickel, zinc, and cyanide concentrations from the tabulated data.

2.5. Trend graphs

To replace the statistical analyses that were previously conducted on the quarterly ground water laboratory and field results, concentration trend graphs were developed, as suggested in MDNR's September 20, 1991 letter, to illustrate the potential concentration fluctuations of key parameters and key

monitoring wells. This is the eighth ground water report to include trend graphs. Copies of the resultant graphs are shown in Appendix C (1995-1998) and Appendix D (1987-1995). The trend graphs illustrate the quarterly results of pH and total chromium, cyanide, manganese, nickel, sulfates, and zinc. Seven of the graphs illustrate the concentrations for the shallow wells upgradient GMW #5S and downgradient wells GMW #4S and GMW #6S. The remaining seven graphs illustrate concentrations for the deep wells upgradient GMW #5D and downgradient wells GMW #4D, GMW #6D, and GMW #9. The data assimilates first quarter 1987 through December 1998 data. Trend graphs were assembled as time (horizontal axis) versus chemical constituent concentration (vertical axis). Data which were not shown were the fourth quarter 1987 data for cyanide in which the detection limits were much higher than the rest of the results and, therefore, would skew the range of results. In addition, prior to third quarter 1991, analytical results for metals were for ground water samples that had been field-filtered and, therefore, represented dissolved metal concentrations. After third quarter 1991, dissolved metals analyses were dropped, and total metals analyses were the only metals constituents monitored.

The plotting of the trend graphs suggests that a sampling or analytical anomaly occurred for GMW #5S and GMW #5D samples for metals during second quarter 1988. These results are illustrated on the trend graph as spikes (Appendix D). This was observed in chromium and nickel concentrations in the shallow well samples and chromium, nickel, and zinc concentrations in the deep well samples.

With regard to the shallow well trend graphs, chromium, cyanide, manganese, nickel, zinc, and sulfates concentrations have generally been higher in downgradient GMW #4S than for GMW #5S (background well) and GMW #6S. The pH of GMW #4S has generally been observed lower than for GMW #5S and GMW #6S.

With respect to the deep wells, the chromium and nickel concentrations of GMW #9 have generally been higher than the chromium and nickel concentrations of GMW #5D (background well), GMW #6D, and GMW #4D. Manganese, sulfates, and zinc have generally been higher in either GMW #4D or GMW #9 than in GMW #5D and GMW #6D. The pH of the observed wells has shown the highest degree of variability. No one well is shown to be consistently higher or lower in pH values than the other wells. Cyanide has remained below detection limits since the second quarter 1991.

Trend graphs will be updated for subsequent annual ground water reports for the site by adding the ground water sample laboratory analytical data from the additional corresponding sampling events.

3. Ground water level data and calculations

3.1. Ground water elevations

Figures 7 through 14 of this report are potentiometric ground water surface elevation maps prepared from the 1998 ground water elevation data for the wells and include a table summarizing the ground water elevation measurements obtained during 1998 quarterly sampling at the wells. In general, the ground water flow directions have fluctuated little from quarter to quarter. As in the past, the observed historical direction of the ground water flow is generally in an easterly to southeasterly direction, toward the One Hundred and Two River.

A comparison of 1997 ground water elevations to 1998 ground water elevations on a quarter-to-quarter basis (*i.e.*, first quarter 1997 compared to first quarter 1998, etc.) indicates ground water elevations for 1998 were as much as 4.52 ft higher than in 1997. Ground water elevations fluctuated between 1.33 and 3.86 ft during 1998. The highest ground water elevations were during second quarter 1998. Shallow well ground water elevations were lowest in the fourth quarter (Table 3.1); deep well ground water elevations were lowest in the third quarter (Table 3.2).

Table 3-1. Shallow well ground water elevations, 1997 and 1998

	First	quarter	Second quarter		Third	Third quarter		quarter
Well	1997	1998	1997	1998	1997	1998	1997	1998
GMW #2S	989.41	990.30	989.04	993.56	988.83	990.89	988.90	989.70
GMW #3	990.36	991.62	990.23	993.75	990.28	991.67	989.84	991.87
GMW #3S	989.02	989.89	988.77	992.77	988.96	990.51	988.56	989.70
GMW #4S	990.26	992.43	990.67	994.62	991.10	992.28	990.39	992.16
GMW #5S	995.41	996.24	994.59	997.26	994.30	996.18	994.48	995.93
GMW #6S	985.87	986.53	985.93	988.05	986.75	987.28	986.05	986.52
PZ-1	991.95	993.34	991.22	995.54	990.96	994.70	991.16	993.14
PZ-2	992.99	994.58	992.30	995.96	992.50	994.15	992.35	994.38
PZ-3	994.58	994.67	994.17	996.25	994.95	996.12	994.41	994.93
PZ-4	993.40	993.70	993.21	996.28	993.32	994.05	993.32	993.99
Source: O'Brien & Gere Engineers, Inc.								

Table 3-2. Deep well ground water elevations, 1997 and 1998

	First	quarter	Second quarter		Third quarter		Fourth quarter		
Well	1997	1998	1997	1998	1997	1998	1997	1998	
GMW #2D	990.18	991.52	990.04	993.35	990.02	991.54	989.65	991.62	
GMW #3D	988.91	989.86	988.83	992.02	989.07	990.22	988.64	990.00	
GMW #4D	990.44	991.95	990.40	993.73	990.40	991.84	989.90	992.13	
GMW #5D	991.33	993.36	991.24	995.04	990.66	992.78	990.43	993.47	
GMW #6D	985.87	986.53	985.93	987.98	986.73	987.16	986.05	986.53	
GMW #7	986.77	988.48	986.46	989.91	987.83	987.29	987.06	987.41	
_GMW #9	990.20	991.63	990.13	993.43	990.19	991.56	989.68	991.85	
Source: O'Br	Source: O'Brien & Gere Engineers, Inc.								

i:\stlouis\projects\3050005\5_rpts\99rpts\98anlrpt.rpt

3.2. Horizontal ground water migration

The ground water flow velocity has been estimated for the shallow and deep well zones using a modified Darcy's Law expression to calculate lineal velocity:

$$V = \underline{Ki}$$
 7.48 Sy

Where

V = average lineal velocity, ft/day K = hydraulic conductivity, gpd/ft² i = average hydraulic gradient, ft/ft Sy = estimated effective porosity

Table 3-3, site hydraulic gradients, and Table 3-4, hydraulic conductivities, were used to estimate the ground water velocities for the upper silt zone and the lower sand zone. A specific yield, Sy (or effective porosity) of 0.18 was used for the silt zone and an Sy of 0.25 was used for the sand zone. The hydraulic gradient was calculated using the differences in hydraulic head between wells GMW #5S and GMW #6S with a horizontal distance between them of 1395 ft for the shallow wells. GMW #5D and GMW #6D, with a horizontal distance between them of 1395 ft, was used to calculate the hydraulic gradients for the deeper wells. A hydraulic gradient was calculated for each quarter, then those four numbers were averaged.

Table 3-3. Site hydraulic gradients (I).

Shallow we	lls (d	1 = 1	395	ft)
------------	--------	-------	-----	-----

Quarter	5S (msl elev.)	6S (msl elev.)	5 S-6S	I (ft/ft)
1	996.24	986.53	9.71	0.0070
2	997.26	988.05	9.21	0.0066
3	996.18	987.28	8.90	0.0064
4	995.93	986.52	9.41	0.0067

Average gradient (I_s) = 0.0067 ft/ft

Doon	wells	(d =	1305	f#1
Deen	MEIIS	14 -	1333	

Quarter	5D (msl elev.)	6D (msl elev.)	5D-6D	I (ft/ft)
1	993.36	986.53	6.83	0.0049
2	995.04	987.98	7.06	0.0051
3	992.78	987.16	5.62	0.0040
4	993.47	986.53	6.94	0.0050

Average gradient (ID) = 0.0048 ft/ft

Source: O'Brien & Gere Engineers, Inc.

Table 3-4. Hydraulic conductivities (K).

Shallow wells	K (gpd/ft²)	Deep wells	K (gpd/ft²)
28	5.1	2D	9.2
3	8.16	4D	5.6
48	1.64	5D	10.1
58	1.95	6D	47.0
6S	14.5	7	7.4
Low K = 1 High K = 1 Average K	4.5	Low K High K Averag	

7.48 (Sy)

Sy for silt - 0.18.

Sy for sand = 0.25

Upper zone is generally silts.

Lower zone is generally sands and some gravel

Source: O'Brien & Gere Engineers, Inc.

Hydraulic conductivities were based upon *in situ* permeability tests performed in November 1985. Table 3-4 summarizes the hydraulic conductivities for the shallow (silt zone) wells, the deeper (sand zone) wells, and the low, high, and average values for each respective zone.

Table 3-5 summarizes the calculated ground water flow velocities for the shallow zone (silt) and deeper zone (sand). The shallow zone has an approximately 50% lower flow velocity than the sand zone when comparing low to low and high to high. However, when averaged, the flow velocity within the silt zone is approximately 85% of that of the sand zone. This tends to confirm the variability in the makeup of the silt and sand and the variability of the completion depths of the monitoring wells.

Table 3-5. Ground water velocities.

	Silt zone	Sands and gravel zone
Low	2.98 ft/yr	5.28 ft/yr
High	26.3 ft/yr	44.0 ft/yr
Average	11.39 ft/yr	14.86 ft/yr
	en & Gere Engineers,	•

3.3. Vertical ground water migration

Table 3-6 presents the 1998 ground water elevation data for the nested well pairs and the difference in elevation between shallow and corresponding deep monitoring wells.

If the ground water elevation in the deep well is higher than in the corresponding shallow well, the hydraulic head in the deep well is higher than in the shallow well. Hence, an upward flow potential exists. Conversely, if the ground water elevation in the shallow well is higher than in the corresponding deep well, the hydraulic head in the shallow well is higher than in the deep well. In this case, a downward flow potential exists.

GMW #2S/#2D had an upward flow potential during the first, third, and fourth quarters of 1998. GMW #3S/3D had a downward flow potential during the first, second, and third quarters of 1998 and an upward flow potential during the fourth quarter 1998. GMW #4S/4D and GMW #5S/5D had downward flow potentials for the four quarters of 1998. GMW #6S/6D had

no vertical flow potential for the first quarter 1998, a slight downward flow potential for the second and third quarters 1998, and a very slight upward flow potential for the fourth quarter 1998.

Table 3-6. Vertical ground water flow potential; 1998 elevation data

Shallow wells	Ground water elevation	Deep wells	Ground water elevation	Shallow -dee elevation	р
28	990.30	2D	991.52	-1.22	t
20	993.56	2.0	993.35	0.21	i
	990.89		991.54	-0.65	Ť
	989.70		991.62	-1.92	1
3S	989.89	3D	989.86	0.03	1
	992.77		992.02	0.75	1
	990.51		990.22	0.29	1
	989.70		990.00	-0.30	1
48	992.43	4D	991.95	0.48	1
	994.62		993.73	0.89	1
	992.28		991.84	0.44	1
	992.16		992.13	0.03	1
58	996.24	5D	993.36	2.88	1
	997.26		995.04	2.22	1
	996.18		992.78	3.40	1
	995.93		993.47	2.46	1
6S	986.53	6D	986.53	0.00	-
	988.005		987.98	0.07	1
	987.28		987.16	0.12	1 -
	986.52		986.53	-0.01	1

^{1 -} direction of apparent relative vertical flow component potential Source: O'Brien & Gere Engineers, Inc.)

4. Conclusions

Based on the 1998 quarterly field activities, ground water elevation data, laboratory analytical results, and well inspection activities performed, the following conclusions are made:

- 1. Regional and site ground water flow direction is primarily in an east to southeast direction toward the One Hundred Two River.
- 2. Analytical results and their respective quality assurance/quality control measures did not indicate the existence of anomalies or inconsistencies that would affect the assessment of the analytical results.
- 3. Analytical data indicate no well had reported concentrations above the post-closure permit ground water protection standards.
- 4. Observations were made of the ground water monitoring wells' surface condition as part of the quarterly sampling activities. During 1998, the ground water monitoring wells' seals and integrity remained intact.
- Reviewing existing 1998 data, reports, and corresponding field activities, it appears that the current ground water monitoring system adequately defines ground water quality and conditions surrounding the former surface impoundment.



20



GROUND WATER MONITORING WELL

PIEZOMETER

INLAND REALTY COMPANY MARYVILLE, MISSOURI

GROUND WATER
MONITORING WELL
LOCATION PLAN

5/4/99 3050.005-109F



FIGURE 2

LEGEND

GROUND WATER MONITORING WELL

NONDETECT

01 REPORTED CONCENTRATION MG/L

INLAND REALTY COMPANY MARYVILLE, MISSOURI

CADMIUM ISOCONCENTRATION MAP SHALLOW WELLS





LEGEND

GROUND WATER MONITORING WELL

ND NONDETECT

NONDETECT

REPORTED CONCENTRATION MG/L

INLAND REALTY COMPANY MARYVILLE, MISSOURI

CYANIDE
ISOCONCENTRATION MAP
SHALLOW WELLS



FIGURE 4

LEGEND

GROUND WATER MONITORING WELL

ND NONDETECT

∼ 0.5 ∼ REPORTED CONCENTRATION MG/L

INLAND REALTY COMPANY MARYVILLE, MISSOURI

MANGANESE ISOCONCENTRATION MAP SHALLOW WELLS





ISOCONCENTRATION MAP SHALLOW WELLS NICKEL

INLAND REALTY COMPANY MARYVILLE, MISSOURI









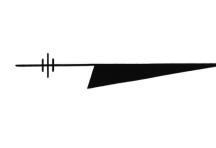


FIGURE 5

FIGURE 6

LEGEND

GROUND WATER MONITORING WELL

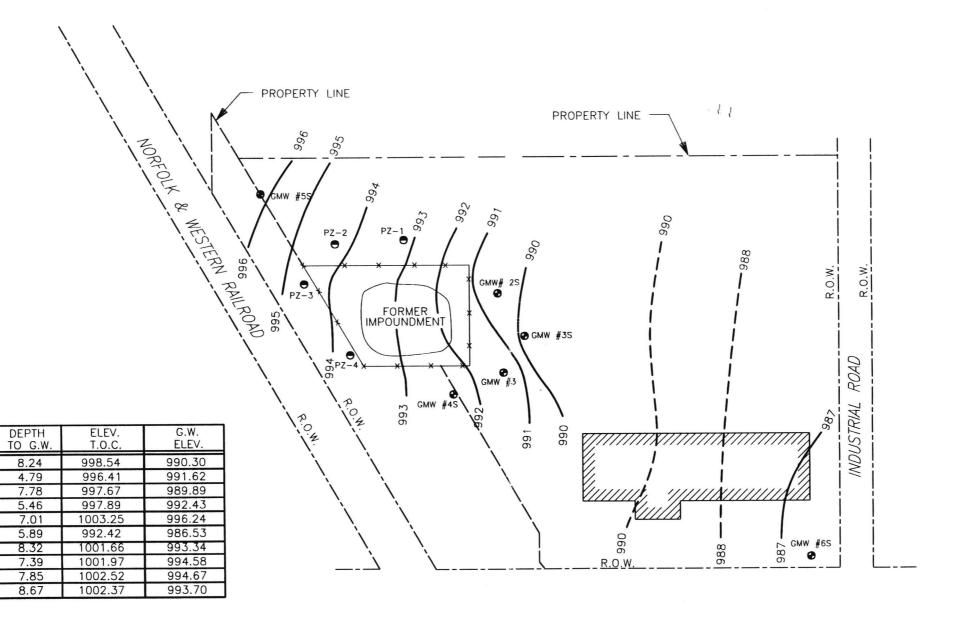
NONDETECT

REPORTED CONCENTRATION MG/L

INLAND REALTY COMPANY MARYVILLE, MISSOURI

MANGANESE ISOCONCENTRATION MAP DEEP WELLS







LEGEND

-990

INFERRED GROUND WATER ELEVATION CONTOUR LINE

- GROUND WATER MONITORING WELL
- PIEZOMETER

INLAND REALTY COMPANY MARYVILLE, MISSOURI FIRST QUARTER 1998 SHALLOW WELLS

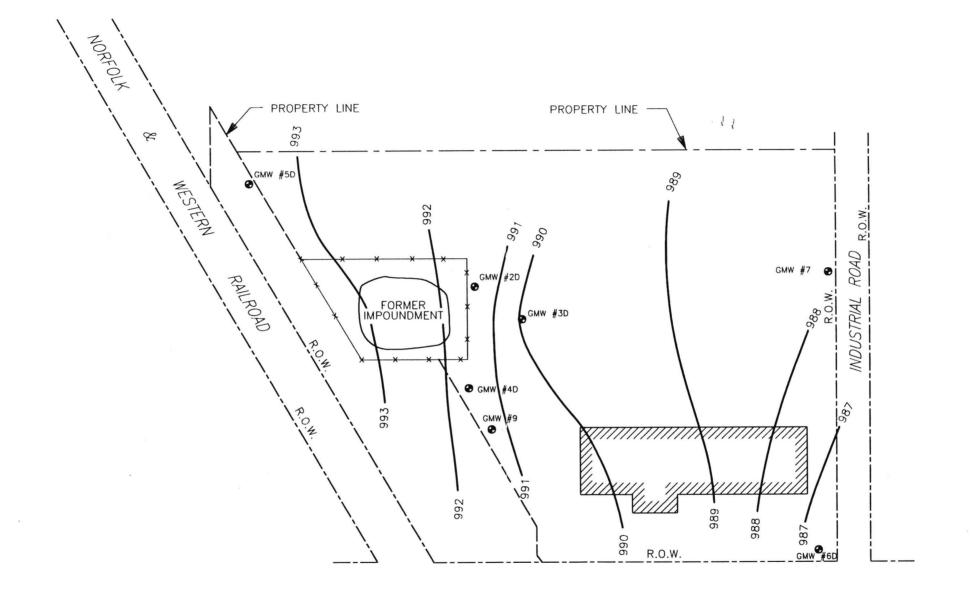
GROUND WATER ELEVATION
CONTOUR MAP

4/22/99 3050.005-200F

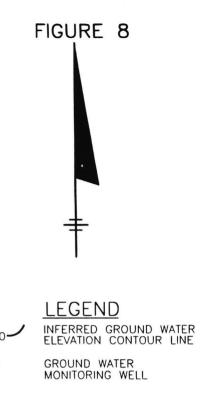


74 /00

6S



WELL NO.	DEPTH TO G.W.	ELEV. T.O.C.	G.W. ELEV.
2D	6.90	998.42	991.52
3D	7.85	997.71	989.86
4D	7.30	999.25	991.95
5D	9.89	1003.25	993.36
6D	5.94	992.47	986.53
7	6.78	994.42	988.48
9	5.71	997.34	991.63



INLAND REALTY COMPANY MARYVILLE, MISSOURI FIRST QUARTER 1998 DEEP WELLS

GROUND WATER ELEVATION
CONTOUR MAP

4/22/99 3050.005-201F





LEGEND

-990*-*

INFERRED GROUND WATER ELEVATION CONTOUR LINE

GROUND WATER MONITORING WELL

PIEZOMETER

INLAND REALTY COMPANY MARYVILLE, MISSOURI SECOND QUARTER 1998 SHALLOW WELLS

GROUND WATER ELEVATION CONTOUR MAP

1/6/98 3050.005-202F



T DATE: 5/4/99

DEPTH TO G.W.

4.98

2.66

4.90

3.27

5.99

4.37

6.12

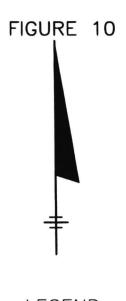
6.01

6.09

45

5S

WELL NO.	DEPTH TO G.W.	ELEV. T.O.C.	G.W. ELEV.
2D	5.07	998.42	993.35
3D	5.69	997.71	992.02
4D	5.52	999.25	993.73
5D	8.21	1003.25	995.04
6D	4.49	992.47	98798
7	4.51	994.42	989.91
9	3.91	997.34	993.43



<u>LEGEND</u>

90 / INFERRED GROUND WATER ELEVATION CONTOUR LINE

GROUND WATER MONITORING WELL

INLAND REALTY COMPANY MARYVILLE, MISSOURI SECOND QUARTER 1998 DEEP WELLS

GROUND WATER ELEVATION
CONTOUR MAP

4/22/99 3050.005-203F



10T DATE: 5/4/99

FIGURE 11

LEGEND

-990ノ

INFERRED GROUND WATER ELEVATION CONTOUR LINE

- GROUND WATER MONITORING WELL
- PIEZOMETER

INLAND REALTY COMPANY MARYVILLE, MISSOURI THIRD QUARTER 1998 SHALLOW WELLS

GROUND WATER ELEVATION
CONTOUR MAP

4/22/99 3050.005-204F



PLOT DATE: 5/5/99

WELL NO. 2S

3

35

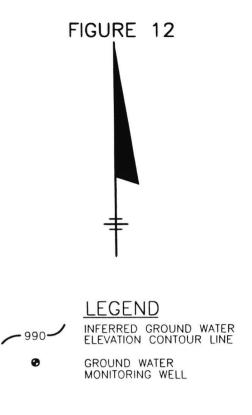
45

5S

65

P2

WELL NO.	DEPTH TO G.W.	ELEV. T.O.C.	G.W. ELEV.
2D	6.88	998.42	991.54
3D	7.49	997.71	990.22
4D	7.41	999.25	991.84
5D	10.47	1003.25	992.78
6D	5.31	992.47	987.16
7	7.13	994.42	987.29
9	5.78	997.34	991.56



INLAND REALTY COMPANY MARYVILLE, MISSOURI THIRD QUARTER 1998 DEEP WELLS

GROUND WATER ELEVATION
CONTOUR MAP

4/22/99 3050.005-205F



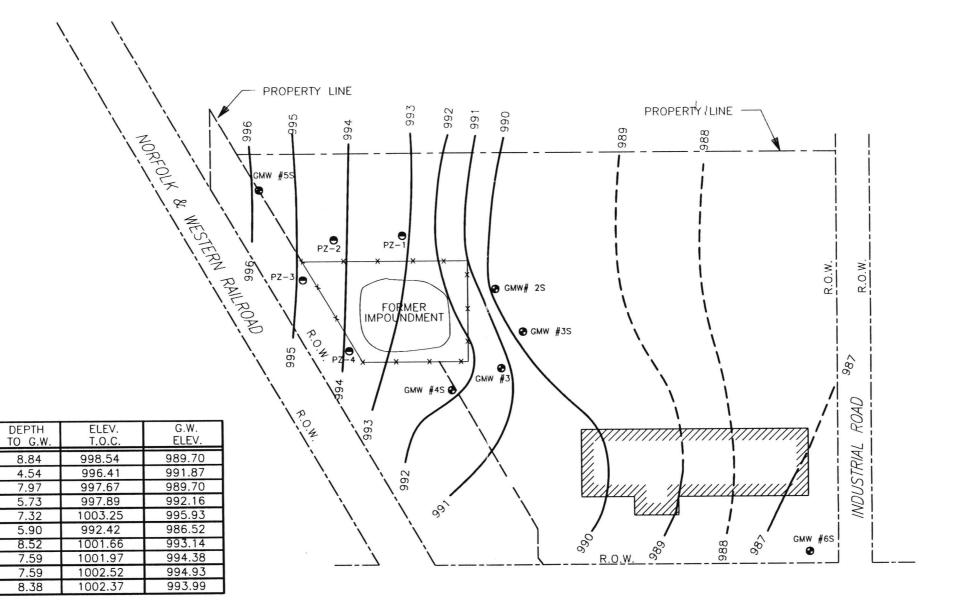


FIGURE 13

LEGEND

-990·

INFERRED GROUND WATER ELEVATION CONTOUR LINE

GROUND WATER MONITORING WELL

PIEZOMETER

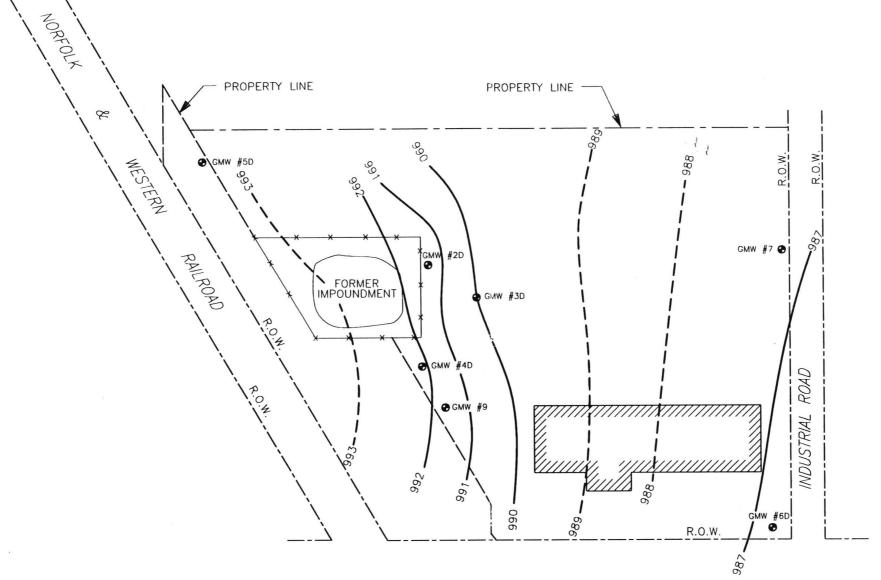
INLAND REALTY COMPANY MARYVILLE, MISSOURI FOURTH QUARTER 1998 SHALLOW WELLS

GROUND WATER ELEVATION CONTOUR MAP

4/22/99 3050.005-206F



WELL NO.



WELL NO.	DEPTH TO G.W.	ELEV. T.O.C.	G.W. ELEV.
2D	6.80	998.42	991.62
3D	7.71	997.71	990.00
4D	7.12	999.25	992.13
5D	9.78	1003.25	993.47
6D	5.94	992.47	986.53
7	7.01	994.42	987.41
9	5.49	997.34	991.85

FIGURE 14

LEGEND

INFERRED GROUND WATER ELEVATION CONTOUR LINE

> GROUND WATER MONITORING WELL

INLAND REALTY COMPANY MARYVILLE, MISSOURI FOURTH QUARTER 1998 DEEP WELLS

GROUND WATER ELEVATION CONTOUR MAP

4/26/99 3050.005-207F



OT DATE: 5 /5 /00

Ground water sampling field logs

	GERE ENGINEER	S, INC.		Ground W	ater Sampling Log			
Date: Site Name: Site Location Personnel:	I Z/q/9 S Inland Realty Co. Maryville, MO William E. Wright				Weather: Well Number: Project Number: Evacuation Method		GMW#28 3050.005	3
Depth of We Depth to Wa Length of W Volume of W 3X Volume o	iter * ater Column /: /ater in Well /	21.75 ft. 2.97 ft. 2.97 ft. 3.97 gal.(s) 25.2 gal.(s)	Volume	6" Diamete	er Well = 0.163 X LV er Well = 0.653 X LV er Well = 1.469 X LV	VC	5_	_gal.(s)
			Did we	ll go dry?	Yes		No	(Other, Specify)
*Measureme	ents taken from	X Top of \	Well Casing	P1	Top of Protective C	asing		(Other, Opeciny)
Water param	neters:		T			ī		
after <i>t</i> 5 after after after after	(gal.) (gal.) (gal.)	initial 62.9	after sinitial		401 7.03 7.14 2.14 2.57	after after after after	84 S Star 1413 S S initial	
Water Samp	ole:	D	1					
Time Collect	ed: / U	40						
Physical App	pearance at Start			Physical A	appearance at Samp	ling		
Color Odor		ione		Color Odor		digh	+ rpc	ddish brown
Turbidity (> Sheen/Free		10			> 100 NTU's) ee Product	>1	0	
				a. 0	. 2 \ C 10	las A	Sanie	de
		(Cd, Cr, CrVI,						
Con	tainer Size	Container Type	Fe, Hg, Mu # Collected	Filtered	Preservative	На	Temp.	Conductivity
500 m	tainer Size	Container Type Poly Poly			Preservative HN03 HN02.	pH 42 42	Temp.	
500 n 500 n 500 n	tainer Size	Container Type		Filtered	Preservative HN03 HN03 NA01+	pH 22	Temp.	
500 m	tainer Size	Container Type Poly Poly		Filtered	Preservative HN03 HN02.	pH 42 42	Temp.	
500 n 500 n 500 n	tainer Size	Container Type Poly Poly		Filtered	Preservative HN03 HN03 NA01+	pH 42 42	Temp.	
500 n 500 n 500 n	tainer Size	Container Type Poly Poly		Filtered	Preservative HN03 HN03 NA01+	pH 42 42	Temp.	
500 n 500 n 500 n	tainer Size	Container Type Poly Poly		Filtered	Preservative HN03 HN03 NA01+	pH 42 42	Temp.	
Con	Vell Integrity Check	Container Type Poly Poly Poly Poly Poly Poly Poly Poly	# Collected	Filtered	Preservative HN03 HN03 NA01+ NA01+	pH 22 22 212	Temp.	Conductivity
Soon 1000 N 500 N 500 N Monitoring V	Vell Integrity Check	Container Type Poly Poly Poly Poly Poly Poly Poly Poly	# Collected	Filtered	Preservative HN03 HN03 Na01+ ms ne	PH 22 22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Temp.	Conductivity
Monitoring V Well identific Well covers Is the well st	Vell Integrity Check cation number clear and locks in good cand pipe vertically	Container Type Poly Poly Poly Poly Poly Poly Poly Poly	# Collected	Filtered	Preservative HN03 HN03 Na01+ Manue Yes Yes Yes	212 212 212	Temp.	Conductivity
Monitoring V Well identific Well covers Is the well st Is the concre	Vell Integrity Check eation number clear and locks in good of and pipe vertically ete pad and surface	Container Type Poly Poly Poly Poly Poly Poly Poly Poly	# Collected	Filtered	Preservative HN03 HN03 Na01+ Mone Yes Yes Yes Yes	212 22 212	No N	Conductivity
Monitoring V Well identific Well covers Is the well st Is the concre Are soils sur Is the PVC v	Vell Integrity Check eation number clear and locks in good of and pipe vertically ete pad and surface frounding the well pevell casing in good	Container Type Poly Po	# Collected	Filtered	Preservative HN03 HN03 Na01+ Mone Yes Yes Yes Yes Yes Yes Yes	212 22 212 V	No N	Conductivity
Monitoring V Well identific Well covers Is the well st Is the PVC v Is there stan Is the stand	Vell Integrity Check cation number clear and locks in good cand pipe vertically set pad and surface rounding the well pivell casing in good ding water in the apipe vented at the	Container Type Poly Po	# Collected	Filtered	Preservative HN03 HN03 Na01+ Mone Yes Yes Yes Yes Yes Yes Yes Y	212 212 212 V	No N	Conductivity
Monitoring V Well identific Well covers Is the well st Is the PVC v Is there stan Is the stand	Vell Integrity Check cation number clear and locks in good cand pipe vertically set pad and surface rounding the well pivell casing in good ding water in the apipe vented at the	Container Type Poly Po	# Collected	Filtered	Preservative HN03 HN03 Na01+ Mone Yes Yes Yes Yes Yes Yes Yes Y	212 212 212 V	No N	Conductivity
Monitoring V Well identific Well covers Is the well st Is the PVC v Is there stan Is the stand	Vell Integrity Check cation number clear and locks in good cand pipe vertically set pad and surface rounding the well pivell casing in good ding water in the apipe vented at the	Container Type Poly Po	# Collected	Filtered	Preservative HN03 HN03 Na01+ Mone Yes Yes Yes Yes Yes Yes Yes Y	212 212 212 V	No N	Conductivity

O'BRIEN & GERE ENGINEERS, INC.	Ground Water Sampling Log
Date: 12/9/98 Site Name: Inland Realty Co. Site Location Maryville, MO Personnel: William E. Wright	Weather: Well Number: Project Number: Evacuation Method GMW#2D 3050.005 bailer
Depth to Water * Length of Water Column Volume of Water in Well 3X Volume of Water in Well	ater Volume /ft. for: Diameter Well = 0.163 X LWC 4" Diameter Well = 0.653 X LWC 6" Diameter Well = 1.469 X LWC Jume removed before sampling gal.(s) Well go dry? Yes No
*Measurements taken from X Top of Well Casing	(Other, Specify)
Water parameters:	
7.	pH Reading Standard
Water Sample: Time Collected: 0940	Į.
Physical Appearance at Start	Physical Appearance at Sampling
Color Odor Turbidity (> 100 NTUs) Sheen/Free Product	Color Odor Turbidity (> 100 NTU's) Sheen/Free Product
Sample Parameters: Metals (Cd, Cr, Cr VI, Fe, H	, Mg, Ni, Ph En), Sultates, Cyanide
Container Size Container Type # Colle 500 ml 500 ml 604 1000 ml 6014	ted Filtered Preservative pH Temp. Conductivity NO HN03 42 404 NO NA 01+ 212 NO HN03 44
Monitoring Well Integrity Checklist: Well identification number clearly marked?	Yes

O'BRIEN &	GERE ENGINEERS,	, INC.		Ground V	Vater Sampling Log			
Date: Site Name: Site Locatio Personnel:	on Maryville, MO			- - -	Weather: Well Number: Project Number: Evacuation Method		GMVV#3 3050.005	43°F
Volume of V	/ater * Vater Column 13 Water in Well 9	8.50 ft. 4.54 ft. 8.96 ft. 9. / gal.(s) 7. 3 gal.(s)		amet 6" Diamet emoved before	ter Well = 0.163 X L ter Well = 0.653 X L ter Well = 1.469 X L ore sampling	wc wc _ <i>2</i> ^	7 No.	gal.(s)
*Measurem	nents taken from	X Top of V	Well Casing	2	Top of Protective (Casing		(Other, Specify)
Water para	meters:		ı			ı		
afte afte afte afte	er	Reading nitial 59.5 56.7 57.6	4.0 Stand 7.0 Stand 10.0 Stand initial after after after after after	ard	3.99 201 6.92 VAT 6.08 6.18 6.58 6.58	after after after after after	84 S Stand 1413 S Sta initial	
Water Sam Time Collec								
	ppearance at Start				Appearance at Samp			
	0							
Sheen/Free	Product			Sheen/Fre	(> 100 NTU's) ee Product	n		
Odor Turbidity (> Sheen/Free Sample Par	Product MC	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre	ee Product	n	one	
Odor Turbidity (> Sheen/Free Sample Par	Product	9		Odor Turbidity (Sheen/Fre	Preservative	n n	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Par	Product MC	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulfa/ Filtered	ee Product	e pH	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Par	Product MC	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulfa Filtered	Preservative HW03 HW03	PH LA	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 / 000 500	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	e pH	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulfa Filtered	Preservative HW03 HW03	PH LA	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 / 000 500	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	PH LA	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 / 000 500	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	PH LA	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 / 000 500	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	PH LA	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 / 000 500	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	PH LA	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 / 000 500	Product Trameters: Cd, Cr, Container Size	OVI, Fe, Hg, Mu	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	PH LA	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 /000 500	Product Trameters: Cd, Cr, Container Size	Container Type Poly Poly Poly Poly	, Ni, Ph, Zn;	Odor Turbidity (Sheen/Fre Sulful Filtered NO NW	Preservative HN03 N. 0 H-3	PH LA	Temp. 4° C 4° C	Conductivity
Odor Turbidity (> Sheen/Free Sample Par Cor 500 500 500 Well identific Well covers Is the well st Is the concre Are soils sul Is the PVC v Is there stand	Avell Integrity Checklis cation number clearly and locks in good cor tand pipe vertically alig ete pad and surface serrounding the well pad well casing in good co ding water in the anni pipe vented at the bas	Container Type Poly Poly Poly Poly	# Collected	Odor Turbidity (Sheen/Free Sulfa Filtered NO NO NO NO NO NO NO NO NO N	Preservative HWD7 HWD7 COID Yes Yes Yes Yes ng? Yes	PH (22 212 -	Temp. 4°C 4°C 4°C 4°C	
Odor Turbidity (> Sheen/Free Sample Par Cor 500 500 500 Well identific Well covers Is the well st Is the concre Are soils sul Is the PVC v Is there stand	Avell Integrity Checklis cation number clearly and locks in good cor tand pipe vertically alig ete pad and surface serrounding the well pad well casing in good co ding water in the anni pipe vented at the bas	container Type Container Type	# Collected	Odor Turbidity (Sheen/Free Sulfa Filtered NO NO NO NO NO NO NO NO NO N	Preservative HWD7 HWD7 COID Yes Yes Yes Yes ng? Yes	PH (22 212 -	Temp. 4° C 4° C 4° C 4° C No No No No No No No	

URRIENS	GERE ENGINEERS,	INC		Ground W	ater Sampling Log			
OBRIEN		, IIVO.		Cround VV		/	./26	5 —
Date:	12/9/98				Weather: Well Number:	de	M 43°	<u> </u>
Site Name:	<u>Inlánd Realty Co.</u> n Maryville, MO				Project Number:		3050.005	
Personnel:	William E. Wright				Evacuation Method			
Depth of We	ell * 2	3.61 ft.	Water \	Volume /ft. for:				
Depth to Wa		97 ft.	1893	2"Diamete	er Well = 0.163 X L\			
	/ater Column 15.	64 ft.			er Well = 0.653 X L\			
	Vater in Well 7	gal.(s) gal.(s)		6" Diamete	er Well = 1.469 X L\		i. sengang ting	
3X Volume (or water in weir Z	gai.(3)	Volume	removed befo	re sampling		<i>9</i> gal.	(s)
				l go dry?	Yes	S	No 1	
				/			(Ot)	her, Specify)
*Measureme	ents taken from	X Top of V	Vell Casing		Top of Protective C	Casing	(00	ner, opecity)
				1				
Water parar	meters:		I			I		
	Temperature	Reading		pH Readin	ng		Conduct	tivity Reading
		3	4.0 Sta	ndard	4.07			1
			7.0 Sta		7.01	1	84 S Standard	
	ir.	nitial 60 1	10.0 St i <u>nit</u> ial	andard	10.50		1413 S Stand initial	1445
afte	/	61.9	after 7	(gal.)	6.76	after .		1.) 1494
afte		6/.	after 6	(gal.)	6,80	after	13-	747-7
afte afte		60.8	after 7	(gal.)	6.91	after after	(gal	
afte			after	(gal.) (gal.)		after	(gal	
Water Samp	1 7 /1	5						
Time Collect								
Physical Ap	pearance at Start			Physical A	Appearance at Samp	olina		
0-1						Jiii 19		
COIOT	101	11/		Color	11	Dar	let	
Color Odor	_ll	one		Color Odor		low	ely ne	
Odor Turbidity (>	100 NTUs)			Odor Turbidity (> 100 NTU's)	low	ne 0	
Odor	100 NTUs)	en D		Odor Turbidity (loce n n	oly V	
Odor Turbidity (> Sheen/Free	Product	0		Odor Turbidity (Sheen/Fre	> 100 NTU's) se Product	low n	Suf D O	
Odor Turbidity (> Sheen/Free	Product	0	n, Ni, Pb,	Odor Turbidity (Sheen/Fre	> 100 NTU's) se Product	low n	000	
Odor Turbidity (> Sheen/Free	Product Ameters: Cd,Cr, (Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre	> 100 NTU's) se Product I de Sulfa Preservative	low n n he s		Conductivity
Odor Turbidity (> Sheen/Free	Product ameters: Cd,Cr,C	Cr VI, Fe, Hg, M	n, Ni, 1 ² b,	Odor Turbidity (Sheen/Fre	> 100 NTU's) see Product Preservative HN01	low none	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Pare Cor /000 M	Product Product Ameters: Cd,Cr, Container Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cyar Filtered Mo	> 100 NTU's) se Product I de Sulfa Preservative	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M	Product Product American Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low none	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M	Product Product American Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cyar Filtered Mo	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M	Product Product American Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M	Product Product American Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M	Product Product American Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M	Product Product American Size	Cr VI, Fe, Hg, M		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M 500 M	Product Pro	Cr VI, Fe, Ha, M Comainer Type		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M 500 M	Product Product American Size	Cr VI, Fe, Ha, M Comainer Type		Odor Turbidity (Sheen/Fre Zn ; Cya i Filtered No No	> 100 NTU's) see Product Preservative HN01	low no	Temp.	Conductivity
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M 500 M Monitoring M	Product Product Antainer Size Well Integrity Checklist cation number clearly	Comainer Type Comainer Type Comainer Type Comainer Type Comainer Type	# Collected	Odor Turbidity (Sheen/Fre Filtered No NU NU NU NU NU NU NU NU NU	> 100 NTU's) see Product Preservative HN03 Na0H COID	loce pro	Temp. you you you you you you you	
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M 500 M Monitoring M Well identific	Product Pro	Comainer Type Comainer Type Fully st: marked?	# Collected	Odor Turbidity (Sheen/Fre Filtered No NU NU NU NU NU NU NU NU NU	> 100 NTU's) see Product Preservative HN03 NAOH COID Yes Yes	les ph c2 c2 z12	Temp. you you you you you you you yo	
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M 500 M Well identifit Well covers Is the well s	Product Pro	Container Type Why Fully St: marked? mondition and secure? igned and secure?	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU NU NU NU NU NU NU NU	> 100 NTU's) see Product Preservative HN03 NAOH COID Yes Yes	low no	Temp. 4°C 4°C 4°C No No No	
Sample Para Cor /000 M 500 M 500 M Well identific Well covers Is the well s Is the concrete sheet of the same of	Product Pro	Container Type Why Fully St: marked? mondition and secure? gned and secure? seal in good condition?	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU NU NU NU NU NU NU NU	> 100 NTU's) see Product Preservative HN03 NAOH COID Yes Yes Yes	How in the second secon	Temp. 4°C 4°C 4°C No No No	
Odor Turbidity (> Sheen/Free Sample Para Cor /000 M 500 M 500 M S00 M Well identifit Well covers Is the well s Is the concr Are soils su Is the PVC M	Product Pro	Container Type Container Type Why Container Type	# Collected	Odor Turbidity (Sheen/Fre En ; Cyan Filtered No Nu Nu Nu Nu Nu Nu Nu Nu Nu	> 100 NTU's) se Product Preservative HN03 HN03 Na0H C0/d Yes Yes Yes	low no	Temp. yo L yo C yo C yo C No No No No No No No	
Sample Para Cor /OOO M 500 M 500 M 500 M Well identifit Well covers Is the well s Is the concr Are soils su Is there star	Product Pro	Container Type Container Type Why Container Type	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU AN AN AN AN AN AN AN AN	> 100 NTU's) se Product Preservative HN03 HN03 Na0H COID Yes Yes Yes Yes Yes Yes Yes Ye	low no	Temp. 4°C 4°C 4°C 4°C No No No No No No No	
Sample Para Cor /OOO M 500 M 500 M 500 M Well identific Well covers Is the well s Is the concr Are soils su Is the PVC Is there start Is the stand	Product Pro	Container Type Container Type Wildy Container Type Wildy Container Type Wildy Container Type Container	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU AN AN AN AN AN AN AN AN	> 100 NTU's) se Product Preservative HN03 NA0H C0/d Yes Yes Yes Yes Yes Yes Yes	low no	No N	
Sample Para Cor /OOO M 500 M 500 M 500 M Well identific Well covers Is the well s Is the concr Are soils su Is the PVC Is there start Is the stand	Product Pro	Container Type Container Type Why Container Type	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU AN AN AN AN AN AN AN AN	> 100 NTU's) se Product Preservative HN03 NA0H C0/d Yes Yes Yes Yes Yes Yes Yes	low no	Temp. 4°C 4°C 4°C 4°C No No No No No No No	
Sample Para Cor /OOO M 500 M 500 M 500 M Well identific Well covers Is the well s Is the concr Are soils su Is the PVC Is there start Is the stand	Well Integrity Checklist cation number clearly and locks in good contained and surface surrounding the well payment casing in good conding water in the anril pipe vented at the batal depth of the well surrounding elevations.	Container Type Container Type Wildy Container Type Container T	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU AN AN AN AN AN AN AN AN	> 100 NTU's) se Product Preservative HN03 NA0H C0/d Yes Yes Yes Yes Yes Yes Yes	low no	No N	
Sample Para Cor /OOO M 500 M	Well Integrity Checklist cation number clearly and locks in good containing the well particular and rete pad and surface surrounding the well casing in good containing water in the antipipe vented at the batal depth of the well s	container Type Container Type Wildy St: marked? midition and secure? gigned and secure? seal in good condition? d eroded? nular space between the ase to provide drainage ounded correspond with ation: 997.67	# Collected	Odor Turbidity (Sheen/Fre Filtered NO NU NU AN AN AN AN AN AN AN AN	> 100 NTU's) se Product Preservative HN03 NA0H C0/d Yes Yes Yes Yes Yes Yes Yes	low no	No N	

O'BRIEN & GERE ENGINEER	RS, INC.		Ground W	Vater Sampling Log			
Date: 12/9/5% Site Name: Inland Realty Co Site Location Maryville, MO Personnel: William E. Wrigh			 	Weather: (Well Number: Project Number: Evacuation Method	3	1	
Depth of Well * Depth to Water * Length of Water Column Volume of Water in Well 3X Volume of Water in Well	36.66 ft. 7.7 l ft. 38.45 ft. 1.7 gal.(s) 14. (gal.(s)		4" Diamete 6" Diamete emoved befo	: er Well = 0.163 X L' er Well = 0.653 X L' er Well = 1.469 X L' ore sampling	wc wc <i>15</i>		gal.(s)
*Measurements taken from	X Top of V	Vell Casing		Top of Protective C	Sasing		(Other, Specify)
Water parameters:		3		J J	J		
	initial 60 3 57.8 57.0 56.4	4.0 Stand 7.0 Stand 10.0 Stand initial after 5 after 7 after 4 after 4 after 4 after 4	ard	7, 03 3, 99 NA 5.30 6.05 6.78	1	84 S Star 413 S Sinitial G	
Water Sample: Time Collected: 143	5D				1		
Physical Appearance at Start			Physical A	Appearance at Samp	oling		
Calar	lear		0.1		1		
Color Odor Turbidity (> 100 NTUs) Sheen/Free Product	none			> 100 NTU's) ee Product	no Ne	ne 10	
Odor Turbidity (> 100 NTUs)	none no	Ph,Zn	Odor Turbidity (we wo	
Odor Turbidity (> 100 NTUs) Sheen/Free Product	none no	Ph,Zn_ # Collected	Odor Turbidity (Temp. 40 C 40 C	Conductivity
Odor Turbidity (> 100 NTUs) Sheen/Free Product Sample Parameters: Cd Cr	CONTAINER Type CONTAINER TYPE	# Collected	Odor Turbidity (Sheen/Fre	Preservative HW03 HW03 Va 0 H C0 ld Yes Yes Yes Yes ng? Yes	pH <2 <2 <2 <2 <2 <2 <2 <4 <4 <4 <4 <4 <4 <4 <4 <4 <4 <4 <4 <4	Temp. 40 C 40 C 40 C	

O'BRIEN & GERE ENGINEER	RS, INC.		Ground V	Vater Sampling Log	
					Pleas Sugar 310F
Date: 2/10/98 Site Name: Inland Realty Co				Weather: Well Number:	GMW#4S
Site Name: Inland Realty Co).			Project Number:	3050.005
Personnel: William E. Wrigh	nt			Evacuation Method	
Depth of Well *	20.48 ft.	Water Volu	ume /ft. foi		
Depth to Water *	5,73ft.			ter Well = 0.163 X L	
Length of Water Column	14.75 ft.			ter Well = 0.653 X L	490 C 190 C
Volume of Water in Well	9,6 gal.(s)		6" Diame	ter Well = 1.469 X L	.WC
3X Volume of Water in Well	38.8 gal.(s)	Volume rei	moved hef	ore sampling	/2 gal.(s)
		Did well go		Ye:	s No No
		· ·			(Other Specific)
*Measurements taken from	X Top of W	ell Casing		Top of Protective ((Other, Specify)
		•			2
Nater parameters:	1				
Temperatu	ıre Reading		pH Readi	ng	Conductivity Reading
		4.0 Standa		3.98	Of C Chanderd
		7.0 Standa 10.0 Stand		1104	84 S Standard
	initial 56.2	initial	ıaıu	5.54	initial 4220
after / 6 (gal.)	54.7	after /O	(gal.)	6.15	after /6 (gal.) 4480
after t ₁₂ (gal.)	55.1	after 12	(gal.)	6.22	after 72 (gal.) 4440
after(gal.)		after	(gal.)		after (gal.)
after(gal.)		after	(gal.)		after (gal.) after (gal.)
after(gal.)		after	(gal.)		(yai.)
Water Sample: Time Collected: /3	3 /)				
			Dhysical	Annearance of Co-	pling
Physical Appearance at Start			rnysical	Appearance at Sam	ping /
Color	ear		Color		deal
Odor	rone		Odor	(- 400 NTI II)	non
Turbidity (> 100 NTUs) Sheen/Free Product	ne			(> 100 NTU's) ree Product	no
One of the or to deduct	no	and the second s	011001111	001104401	
Sample Parameters: Co4Cr,	Cr VI, Fe, Hs, Mn,	Mi, Pb, Zn; C	yanid	e Sulfates	
Container Size	Container Type	# Collected	Filtered		pH Temp. Conductivity
1000 mg	Par		nò	HNO3	22 100
500 Mg	13014		no	HNOZ	22 40 11/1
500 NV	1314	!	no	Naoth	>12-4.6
300 M	Polý		NO	TO TO	
				-	
Monitoring Well Integrity Chec	cklist:				/
AA7-11 (-1					No.
Well identification number clean Well covers and locks in good					
ls the well stand pipe vertically	aligned and secure?				s No
is the well stand pipe vertically is the concrete pad and surfa	ce seal in good condition?			Ye	No No
Are soils surrounding the well					
Is the PVC well casing in good	d condition?			Ye	es No
Is there standing water in the					
Is the stand pipe vented at the Does the total depth of the we	e base to provide drainage?	original wall same	otion dark	Ye	No No
Does the total depth of the we	ii sounded correspond with	original well compl	euon dept	119 : Y E	-5 INU
NOTES: Top of casing el	evation: 997.89				
Depth to Ground	d Water: <i>5</i> .7 3				
Ground Water					l l

O'BRIEN & GEF	RE ENGINEERS	S, INC.		Ground W	ater Sampling Log			
	1 1/9 /48 land Realty Co.	/			Weather: Well Number:		45° F	
Site Location Ma Personnel: W	aryville, MO /illiam E. Wright	~		_	Project Number: Evacuation Method	bailer	3050.005	
Depth of Well * Depth to Water Length of Water Volume of Wate 3X Volume of W	r Column 2 er in Well 4	37.09 ft. 7./2-ft. 9.97 ft. 6.9 gal.(s)	(4" Diamete 6" Diamete emoved befo	er Well = 0.163 X L' er Well = 0.653 X L' er Well = 1.469 X L'	wc wc /.	<i>5</i>	gal.(s)
*Measurements	taken from	X Top of V	Vell Casing		Top of Protective C	Casing		(Other, Specify)
Water paramete						9		<u> </u>
after	Temperature	Reading	4.0 Stand 7.0 Stand 10.0 Stand initial after	dard ndard	3.98 7.00 NA 5,25		84 S Star 1413 S S initial	tandard 14/7 1355
after after after after	(gal.) (gal.) (gal.) (gal.) (gal.)	54.5 54.7	after 15 after after after	(gal.) (gal.) (gal.) (gal.) (gal.)	6.40	after after after after after	ro	(gal.) /61/ (gal.) /69/ (gal.) (gal.)
Water Sample: Time Collected: Physical Appear	ance at Start			Physical A	ppearance at Samp	olina		
Color		clear		Color	ppodranio at ourne	,,g	l. a.s.	
Odor	NTIL >	none		Odor			non	e
Turbidity (> 100 Sheen/Free Prod		no		Sheen/Fre	> 100 NTU's) e Product		no	
Sample Paramet	ters: Cd, Cr, C	CrvI, Fe.Hg,M	n, Ni, Pb, Zu	-; Sulfo	tes, Cyanic	ke		
Containe /0 00 mx		Container Type	# Collected	Filtered	Preservative	pH <z< th=""><th>Temp.</th><th>Conductivity</th></z<>	Temp.	Conductivity
500 N		Poly		no	HN03	42	40 C	11.1
500 m	l	Poly		no	WADH	212	400	/V V)
Appitoring \A/o!!	Integrity Checklis	et·						_
Vell identification Vell covers and s the well stand s the concrete p ure soils surroun	n number clearly locks in good co pipe vertically al pad and surface s nding the well pa	marked? ondition and secure? igned and secure? seal in good condition?. d eroded?			Yes Yes Yes Yes	V	No No No No	
s there standing s the stand pipe	water in the and vented at the ba	ondition? nular space between the ase to provide drainage? ounded correspond with	e well stand pipe ar	nd PVC casir	ıg?Yes Yes	V	No No No No	
De	p of casing eleval pth to Ground Wound Water Fley	Vater: 7.12	•					

O'BRIEN & GERE ENGI	NEERS, INC.		Ground W	ater Sampling Log			
Date: Site Name: Site Location Personnel: Villiam E.	ty Co. 10		- - -	Weather: Well Number: Project Number: Evacuation Method		M 3 GMW#5S 3050.005	180F
Depth of Well * Depth to Water * Length of Water Column Volume of Water in Well 3X Volume of Water in V	2-7 gal.(s)		4" Diamete 6" Diamete moved befo	er Well = 0.163 X LV er Well = 0.653 X LV er Well = 1.469 X LV re sampling Yes	VC	No	gal.(s)
*Measurements taken fro	m X Top of We	II Casing		Top of Protective C	asing [(Other, Specify)
Water parameters:	1	*			ı		
after <u>3</u> after <u>6</u> after <u>9</u> after	initial 59./ gal.) 58.2 gal.) 58.2 gal.) gal.)	4.0 Standa 7.0 Standa 10.0 Standa initial after after after after	ard	9.03 7.03 NA 6.44 6.52 6.53		84 S Stan 1413 S St initial 3 6	
Water Sample: Time Collected:	1145				1		
Color Odor Turbidity (> 100 NTUs) Sheen/Free Product Sample Parameters:	Clare Mare MCr, Cr VI, Fe, Hz, MA	in, Ni, Pb, Z	Color Odor Turbidity (Sheen/Fre		cle	eder v	
Container Size	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
Logo met 50	no Polis) ha	no	HN03	42	406	1/1
96 500 ml	Poly	1	no no	Na. BH COI d	212	400	/V
	r clearly marked?				V	No.	
Is the well stand pipe ver Is the concrete pad and a Are soils surrounding the Is the PVC well casing in Is there standing water in Is the stand pipe vented	good condition and secure? tically aligned and secure? surface seal in good condition? well pad eroded? good condition? the annular space between the vat the base to provide drainage? te well sounded correspond with o	well stand pipe an	d PVC casi	Yes	V	No No No	
Depth to G	ng elevation: 1003.25 round Water: 232 ater Elevation: 995.91	<u> </u>					

O'BRIEN & GERE ENGI	NEERS, INC.		Ground W	ater Sampling Log			
Date: 12/10/9 Site Name: Inland Real Site Location Maryville, M Personnel: William E.	lty Co. MO			Weather: Well Number: Project Number: Evacuation Method		GMW#5E 3050.005	
Depth of Well * Depth to Water * Length of Water Column Volume of Water in Well 3X Volume of Water in W	4. Sgal.(s)		4" Diamete 6" Diamete	er Well = 0.163 X L' er Well = 0.653 X L' er Well = 1.469 X L' pre sampling	wc wc	No	gal.(s)
*Measurements taken from	om X Top of \	Well Casing		Top of Protective C	Casing		(Other, Specify)
Water parameters:		ī.			í		
after <u>5</u> (after / <u>0</u> (after / <u>5</u> (after (initial 60.9 gal.) gal.) gal.) gal.) gal.) gal.)	4.0 Stand 7.0 Stand 10.0 Stand initial after 5 after / 0 after / 5 after after	lard	9,0/ 5.04 NA 7.03 7.17 7.22 7.19		84 S Star 1413 S S initial 5 /0 /5	ductivity Reading dard // / tandard // /8 (gal.) // (gal.) // (gal.) // (gal.) // (gal.) // (gal.)
Water Sample:				,			
Time Collected:	230						
Physical Appearance at S			Physical A	ppearance at Samp	oling		
Color Odor Turbidity (> 100 NTUs) _ Sheen/Free Product	clear none no		Color Odor Turbidity (Sheen/Fre	> 100 NTU's) se Product	n	ne o	
Sample Parameters:	Cr, Cr bI, Fe, Hg, Mn,	, Ni, Pb, Zn;	Cyanid	e; Sulfates			
Container Size	Container Type	# Collected	Filtered	Preservative	pH	Temp.	Conductivity
1000 m / 500 m/	- Paly	 	no	HN03	22	400	AI A
500m/	BIL		NO.	NO DIF	212		WH
500 mg	1314	1	nu	Cold	_	400	/ / //
		+					
Well covers and locks in Is the well stand pipe vert Is the concrete pad and s Are soils surrounding the Is the PVC well casing in Is there standing water in	r clearly marked?	ne well stand pipe an	nd PVC casi	Yes Yes Yes Yes Yes Yes Yes Yes Yes	V	No No No	V
Does the total depth of th	e well sounded correspond wit	th original well comp	letion depth	s?Yes	V	No.	
Depth to Gr	ng elevation: 1003.25 round Water: 9.7 ater Elevation: 993.9						

Name* Inland Realty Co. Maryville, MO Sonnel: William E. Wright Water Volume /ft. for: Sonnel: William E. Wright Water Volume /ft. for: Sonnel: William E. Wright Water Volume /ft. for: Sonnel: Water in Well Water Volume /ft. for: Sonnel: Water in Well Water Volume /ft. for: Sonnel: Water in Well Water Volume /ft. for: Sonnel: Water in Well = 0.163 X LWC Sonnel: Water in Well = 0.653 X LWC Sonnel: Water Well = 0.653 X LWC Sonnel: Water in Well = 0.653 X LWC Sonnel: Water Well = 0.653 X LWC Sonnel: Water Well = 0.653 X LWC Sonnel: Water in Well = 0.653 X LWC Sonnel: Water Volume /ft. for: Sonnel: Water Well = 0.653 X LWC Sonnel: Water Well = 0.65		RS, INC.		Ground Wa	ater Sampling Log			
thit to Water * 5,49 ft.	ite Location Maryville, MO				Well Number: Project Number:	GN 305	IW#9	
Volume removed before sampling Did well go dry? Yes No	epth of Well * epth to Water * ength of Water Column folume of Water in Well	5.49 ft. 54.48 ft. 4 gal.(s)		2" Diamete 4" Diamete	r Well = 0.653 X L	.WC		
ter parameters: Temperature Reading	Volume of water in well	yai.(s)			re sampling Ye	12 s		
Temperature Reading A.O. Standard A.O. St	Measurements taken from	X Top of V	Vell Casing		Top of Protective (Casing	(Other, S	Specify)
7.0 Standard 10.0 Standard 11.0 Standard 11.0 Standard 11.0 Standard 11.0 Standard 11.1 S Stan	/ater parameters: Temperatui	re Reading			9		Conductivity I	Reading
Physical Appearance at Start Color Shehlly Cloudy Color Color	after 8 (gal.) after /2 (gal.) after (gal.)	initial 55 55.5 57.4 57.7	10.0 Stan initial after <u>4</u> after <u>8</u> after <u>/2</u> after	dard (gal.) (gal.) (gal.) (gal.)	6.62 6.62 6.61 6.58	14' initi after 9 after 12 after 12 after	3 S Standard al	NH 1418 3/2 307 245 333
Color Odor Didity (> 100 NTUs) Didity (> 100 N	Vater Sample: ime Collected: /03	5	l			1		
Container, Size Container Type # Collected Filtered Preservative pH Temp. Conductivity So o m Collected Filtered Product Conductivity Collected Filtered Preservative pH Temp. Collected Filtered Preservative pH Temp. Collected Preservative	hysical Appearance at Start			Physical A	ppearance at Sam	pling	4 4	
Sheen/Free Product Sheen/Free Product Sheen/Free Product Sheen/Free Product Sheen/Free Product Sheen/Free Product M Sheen/Free Pro	olor	none		Odor	> 100 NTU'e)	shehlig	cloudy	
Container Size Container Type # Collected Filtered Preservative pH Temp. Conductivity / 000 m)dor	na)					ξ	
1000 m	dor urbidity (> 100 NTUs) neen/Free Product	no		Sheen/Free	e Product	m		
500 m Poly 1 no Nalt 212 40C /V/	ample Parameters:			Sheen/Free	e Product de, Salfak		emp Con	ductivity
500 M - Poly 1 M G/d - 4°C /	container, Size			Sheen/Free	Preservative	T Ha	emp. Con	ductivity
	rbidity (> 100 NTUs) een/Free Product mple Parameters: Col, Cr, Container, Size / 000 m.l 500 m.l			Sheen/Free	Preservative	pH T	06 /	ductivity
	rbidity (> 100 NTUs) een/Free Product mple Parameters: Col, Cr, Container, Size / 000 m.l 500 m.l			Sheen/Free	Preservative	pH T	06 /	ductivity
	rbidity (> 100 NTUs) een/Free Product mple Parameters: Col, Cr, Container, Size / 000 m.l 500 m.l			Sheen/Free	Preservative	pH T	06 /	ductivity
	rbidity (> 100 NTUs) een/Free Product mple Parameters: Col, Cr, Container, Size / 000 m.l 500 m.l			Sheen/Free	Preservative	pH T	06 /	ductivity
	rbidity (> 100 NTUs) een/Free Product mple Parameters: Col, Cr, Container, Size / 000 m.l 500 m.l			Sheen/Free	Preservative	pH T	06 /	ductivity
./	container, Size / 600 m. 500 m. 500 m. 500 m.	Container Type		Sheen/Free	Preservative	pH T	06 /	ductivity
Il identification number clearly marked?	container, Size Contai	klist: condition and secure?	# Collected	Sheen/Free Cyan Filtered NO NO NO NO	Preservative HN03 NADH Co/d	pH TI	No	ductivity
Il covers and locks in good condition and secure? No ne well stand pipe vertically aligned and secure? No No No No No No No No No N	container, Size Contai	klist: condition and secure? aligned and secure? se seal in good condition? pad eroded?	# Collected	Sheen/Free	Preservative HN03 HN03 NADH Co/d Ye Ye Ye Ye	pH Ti	No No No No	ductivity
Il covers and locks in good condition and secure?	container, Size Contai	klist: condition and secure? aligned and secure? be seal in good condition? condition? condition? annular space between the base to provide drainage?	# Collected	Filtered MO NO NO NO NO NO NO NO NO NO	Preservative Preservative HN03 HN03 WAD H COLD Ye Ye Ye Ye Ye Ye Ye Ye Ye Y	pH Ti	No	ductivity

	E ENGINEERS,	INC.		Ground Wa	ater Sampling Log			
Site Name: Inia	nd Realty Co. yville, MO iam E. Wright				Weather: Well Number: Project Number: Evacuation Method		GMW#6S 3050.005	
Depth of Well * Depth to Water * Length of Water (Volume of Water 3X Volume of Wa	Column in Well	1.55 ft. 90 ft. ft. gal.(s) gal.(s)	Water Vo	4" Diamete	r Well = 0.163 X L\ r Well = 0.653 X L\ r Well = 1.469 X L\	VC		
,	level on	//	Did well g		Yes		No	gal.(s) (Other, Specify)
*Measurements to Water parameters	V	// X Top of V	Vell Casing		Top of Protective C	asing		
after after after after after after	Temperature F	Reading itial	4.0 Stand 7.0 Stand 10.0 Stand initial after after after after after after	dard ndard _(gal.) _(gal.)		1	84 S Stan 1413 S St initial	
Water Sample: Time Collected:						l		
Color Odor Turbidity (> 100 N Sheen/Free Produ	TUs)			Color Odor	ppearance at Samp 100 NTU's) Product	ling		
Container	Size	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
Well covers and lo is the well stand p	number clearly r ocks in good con ipe vertically alig d and surface se	marked?dition and secure?ned and secure?eal in good condition?.eroded?			Yes Yes Yes	V	No _ No _ No _ No _ No _ No _	

O'BRIEN & GERE ENGINEERS, INC.			Ground Wa	ater Sampling Log			
Cita I anation Mampaille MAC				Weather: Well Number: Project Number:		GMW#6D 3050.005	
Personnel: William E. Wright				Evacuation Method	bailer		
Depth of Well * 28.65 ft.		Water Volu					
Depth to Water * Length of Water Column Volume of Water in Well 3X Volume of Water in Well gal.			4" Diamete	r Well = 0.163 X LW r Well = 0.653 X LW r Well = 1.469 X LW	IC		
Water level on	k	Volume ren Did well go		re sampling Yes		No	gal.(s) ——— (Other, Specify)
*Measurements taken from X	Top of Well Casi	ng [V	Top of Protective Ca	sing		
Water parameters:	1			I			
Temperature Reading		4.0 Standa 7.0 Standa 10.0 Stand initial	rd			84 S Stand	ductivity Reading dard andard
after (gal.)	after	IIIIIIIII	(gal.)	0	after		(gal.)
after (gal.)	after				after		(gal.)
after(gal.)	after		(gal.)				(gal.)
after (gal.)							(gal.)
after(gal.)	alter	-	(gal.)		aitei		(gai.)
Water Sample: Time Collected: Physical Appearance at Start		1	Physical A	ppearance at Sampli	ng		
Color			Color				
Odor			Odor				
Turbidity (> 100 NTUs)		-		> 100 NTU's)			
Sheen/Free Product			Sheen/Fre	e Product			
Sample Parameters:		*					
Container Size Contai	ner Type # Co	ollected	Filtered	Preservative	рН	Temp.	Conductivity
		٠.,					
Monitoring Well Integrity Checklist:							
Well identification number clearly marked? Well covers and locks in good condition an Is the well stand pipe vertically aligned and	d secure?			Yes	U		
Is the concrete pad and surface seal in good	d condition?			Yes	V	No	
Are soils surrounding the well pad eroded?				Yes		No	
Is the PVC well casing in good condition?						No	
Is there standing water in the annular space							
Is the stand pipe vented at the base to provide the total depth of the well sounded co					V	No No	
	.).						
NOTES: Top of casing elevation: Depth to Ground Water: Ground Water Elevation:	99 8 .47 5.94 593. 5-3 98	76.53					

O'BRIEN & GERE ENGINEER	RS, INC.		Ground Wa	ater Sampling Log			
Date: Inland Realty Co Site Location Maryville, MO Personnel: William E. Wrigh				Weather: Well Number: Project Number: Evacuation Method		GMW#7 3050.005	
/olume of Water in Well X Volume of Water in Well	27.87 ft. 7.0/ft. 3.86ft. 3.4 gal.(s) 10.2 gal.(s)	Volume r	4" Diameter 6" Diameter removed befor		NC NC		gal.(s)
Matus level Measurements taken from		Did well o		Yes Top of Protective C		_	(Other, Specify)
Nater parameters:		g		,		L	
Temperatu after(gal.) after (gal.)	re Reading initial	4.0 Stand 7.0 Stand 10.0 Stand initial after after	dard ndard _(gal.)		after	84 S Stand 1413 S Sta initial	
after (gal.) after (gal.)		after	(gal.)		after		(gal.)
after (gal.)		after	(gal.) (gal.)		after		(gal.) (gal.)
Color Odor Ourbidity (> 100 NTUs) Cheen/Free Product Cample Parameters:			Color Odor Turbidity (> Sheen/Free	100 NTU's) Product			
Container Size	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
		```	4				
Monitoring Well Integrity Check Vell identification number cleat Vell covers and locks in good is the well stand pipe vertically is the concrete pad and surfacture soils surrounding the well passed in good is the PVC well casing in good is there standing water in the a	rly marked?condition and secure?aligned and secure?e seal in good condition?cad eroded?condition?			Yes Yes Yes Yes Yes Yes	V		
s the standing water in the a s the stand pipe vented at the Does the total depth of the well	base to provide drainage?	?		Yes		No_ No_ No	
NOTES: Top of casing ele Depth to Ground Ground Water E	vation: 997.42 Water: 7.0/						

O'BRIEN & GERE ENGIN	EERS INC		Ground Wa	ter Sampling Log			
-	_						
Date: 12/8/92				Veather:			
Site Name: Inland Realty				Vell Number:		PZ-1	
Site Location Maryville, Me				Project Number:		3050.005	
Personnel: William E. V	/right		E	vacuation Method	bailer		
Depth of Well *	20.32 ft.	Water Vo	lume /ft. for:				
Depth to Water *	8.52th			Well = 0.163 X LV			
Length of Water Column	ft.			Well = 0.653 X LV		4 85 114	
Volume of Water in Well	gal.(s)		6" Diameter	Well = 1.469 X LV	VC	10 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A	
3X Volume of Water in We	ellgal.(s)						
			emoved before	e sampling			al.(s)
		Did well o	go dry?	Yes		No_	
						(	Other, Specify)
*Measurements taken from	n X Top of V	Vell Casing	T	op of Protective Ca	asina	,	Outer, opecity)
Moderation to taken her		· · · · · · · · · · · · · · · · · · ·					
Water parameters:							
~	reture Deading		nU Dazadia			C	uotivity Poodina
Tempe	rature Reading	400-	pH Reading			Cond	uctivity Reading
		4.0 Stand				04 6 64	ord
		7.0 Stand 10.0 Stan				84 S Stand 1413 S Sta	
	initial		idard _				nuaru
ottor /-	initial	initial	(asl )		after	initial	nal /
	al.)	after	_ (gal.) _		after		gal.)
	al.)	after	(gal.)		after		gal.) gal.)
	al.)	after after	(gal.)		after		
	al.)	S1			- Account		gal.) gal.)
after(g	al.)	after	(gal.)		aitei		gai.)
Water Sample: Time Collected:						1	
Physical Appearance at S	art		Physical Ap	pearance at Sampl	ing		
0-1			Color				
Color			Color Odor				
Odor Turbidity (> 100 NTUs)				100 NTU's)			
Sheen/Free Product		-	Sheen/Free				
				. ,			
0 1 0 14	atan Lauri Only						
Sample Parameters: W	ater Level Only						
Container Size	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
			1				
			-				
		L					
Monitoring Well Integrity C	hecklist:						
,,,,,,,,,,,							
Well identification number	clearly marked?			Yes		No_	
	ood condition and secure?					No_	
Is the well stand pipe verti	cally aligned and secure?			Yes		No_	
Is the concrete pad and su	rface seal in good condition?.			Yes		No	
	vell pad eroded?					No_	
Is the PVC well casing in	good condition?			Yes		No	
	the annular space between th					No	
Is the stand pipe vented a	the base to provide drainage	?		Yes		No	
Does the total depth of the	well sounded correspond wit	h original well com	pletion depths	?Yes		No_	
NOTES: Top of casin		<u> </u>					
Depth to Gr	ound Water: \$.5	-					
	er Elevation: 993.14						

O'BRIEN & GERE ENGINEE	ERS, INC.		Ground Wa	ater Sampling Log			
Date:  Dite Name: Inland Realty Color Maryville, MO Dersonnel: William E. Wrig				Weather: Well Number: Project Number: Evacuation Method	bailer	PZ-2 3050.005	
epth of Well * epth to Water * ength of Water Column olume of Water in Well X Volume of Water in Well	20.32 ft.  2.59 ft.  tt. gal.(s) gal.(s)	Volume	4" Diameter		WC		gal.(s)
Measurements taken from	X Top of V	Vell Casing		Top of Protective C	asing	(	Other, Specify)
Vater parameters:							
	ure Reading	4.0 Sta 7.0 Sta 10.0 St initial	ndard _ andard _			84 S Stand 1413 S Sta initial	ndard
after (gal.) after (gal.)		after after	/ 1 \				gal.) gal.)
after(gal.)		after	(gal.)		after	(	gal.)
after(gal.) after (gal.)		after after	(gal.) (gal.)		after after		gal.) gal.)
	er Level Only		Color Odor Turbidity (> Sheen/Free	100 NTU's) Product			
Container Size	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
		5					
Vell identification number cle Vell identification number cle Vell covers and locks in good the well stand pipe verticall the concrete pad and surfa re soils surrounding the wel the PVC well casing in good there standing water in the the stand pipe vented at thoos the total depth of the we	arly marked?	e well stand pipe	and PVC casin	Yes		No No No No No No No No	
IOTES: Top of casing e		2					

O'BRIEN &	GERE ENGINEERS,	INC.		Ground Wa	ter Sampling Log			
	Inland Realty Co. Maryville, MO William E. Wright			V	Veather: Vell Number: Project Number: Evacuation Method		PZ-3 3050.005	
Volume of V		0.28 ft. 59 ft. ft. gal.(s) gal.(s)		4" Diameter 6" Diameter emoved before		VC	g:	al.(s)
*Measureme	ents taken from	X Top of V	Vell Casing		op of Protective Ca	asing	(0	Other, Specify)
Water parar	neters:							
·	Temperature F	Reading	4.0 Stand 7.0 Stand 10.0 Stand Initial	dard	, , , , , , , , , , , , , , , , , , ,		84 S Standa	ard
afte afte afte	r (gal.) r (gal.) r (gal.) r (gal.) r (gal.) r (gal.)		after after after after	(gal.) (gal.) (gal.)		after after after after	( <u>c</u> ( <u>c</u> (c)	gal.) gal.) gal.)
Water Samp	ole:			(3)				,,
Color Odor	100 NTUs) Product	vel Only		Color Odor	pearance at Sampl 100 NTU's) Product			
Cor	ntainer Size	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
Monitoring V	Vell Integrity Checklis	t:	2					
Well covers Is the well st Is the concre Are soils sur Is the PVC v Is there stand	and locks in good cor tand pipe vertically alige ete pad and surface s rrounding the well pad well casing in good conding water in the anni pipe vented at the bas	marked?  ndition and secure?  gned and secure? eal in good condition? eroded?  ndition?  ular space between the se to provide drainage' unded correspond with	e well stand pipe a	nd PVC casin	Yes		No No No No No	
NOTES:	Top of casing elevat Depth to Ground W Ground Water Eleva	ater: 7.5°	3					

D'BRIEN & GERE ENGINEE	RS, INC.		Ground Wa	ater Sampling Log			
late: /z/8/98 ite Name: Inland Realty C	•		,	Weather: Well Number:	2	PZ-4	
ite Lecation Manuille MO	0.						
	tht					3030.003	
te Location Maryville, MO ersonnel: William E. Wrig epth of Well * epth to Water * ength of Water Column blume of Water in Well K Volume of Water in Well Measurements taken from //ater parameters:  Temperat  after (gal.)	20.14 ft.  20.14 ft.  1. ft.  1. gal.(s)  2. Top of \  2. ure Reading	Water Vo	plume /ft. for: 2" Diameter 4" Diameter 6" Diameter emoved before go dry?  pH Reading dard dard dard dard (gal.) (gal.) (gal.)	r Well = 0.163 X L\ r Well = 0.653 X L\ r Well = 1.469 X L\ re sampling Yes Top of Protective C	MC NC NC NC asing after after after after after after	Cond 84 S Stanc 1413 S Stainitial	gal.(s) Other, Specify)  Juctivity Reading dard andard gal.) gal.) gal.) gal.)
			Color Odor Turbidity (> Sheen/Free	· 100 NTU's) e Product			
ample Parameters: Wate	Container Type	# Collected	Filtered	Preservative	рН	Temp.	Conductivity
						•	
			1	***************************************			
			-		-		
					-		
				****			
onitoring Well Integrity Checkell identification number cleckell covers and locks in good the well stand pipe verticall the concrete pad and surface soils surrounding the well	arly marked? I condition and secure? y aligned and secure? ce seal in good condition? pad eroded?			YesYesYesYes		No	
the PVC well casing in good	d condition?			Yes		No_	
there standing water in the	annular space between th	e well stand pipe ai	nd PVC casin	g?Yes		No_	
the stand pipe vented at the pes the total depth of the we						No_	
res une total deput of the We	ii sounded correspond Wit	ii origiriai weli com	Jieuon depths	· · · · · · · · · · · · · · · · · · ·		NO _	
OTES: Top of casing e Depth to Groun Ground Water I	Water: 5.3	8					

Laboratory analytical reports

American Technical & Analytical Services, inc.

875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

December 28, 1998

William E. Wright O'Brien & Gere Engineers, Inc. 5000 Cedar Plaza Parkway St. Louis, MO 63128

RE: ATAS #24890.01-#24890.05

#3050.005 - Inland Realty Co, Maryville, Missouri

Dear Mr. Wright:

Enclosed are the analytical reports for the samples received in our laboratory on December 11, 1998.

If, in your review, you should have any questions or require additional information, please call me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Ruseal Brewer Project Manager

**Enclosures** 

RB/jp

REPORT: 2489001MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE : 12-28-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # : 24890.01

DATE SUBMITTED: 12-11-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #4S

REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
	INOR	GANICS	9	
0.005 667	mg/L mg/L	0.015 1990	12-16-98 12-22-98	SW 9010 EPA 375.4
	ME	TALS		
0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	0.007 0.007 0.061 0.552 ND 30.3 ND 0.431 1.61	12-18-98 12-18-98 12-11-98 12-21-98 12-16-98 12-16-98 12-17-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010
	0.005 667 0.005 0.005 0.005 0.005 0.002 0.005 0.0002 0.0002	UNITS   UNITS   INORGOOD   Mg/L   MET	INORGANICS  O.005 mg/L 0.015 667 mg/L 1990  METALS  O.005 mg/L 0.007 O.005 mg/L 0.007 O.005 mg/L 0.007 O.05 mg/L 0.061 O.05 mg/L 0.552 O.002 mg/L ND O.005 mg/L ND	INORGANICS  O.005 mg/L 0.015 12-16-98 mg/L 1990 12-22-98  METALS  O.005 mg/L 0.007 12-18-98 0.005 mg/L 0.007 12-18-98 0.05 mg/L 0.061 12-11-98 0.05 mg/L 0.552 12-21-98 0.005 mg/L ND 12-16-98 0.005 mg/L ND 12-16-98 0.005 mg/L ND 12-16-98 0.0002 mg/L ND 12-16-98 0.0002 mg/L ND 12-17-98 0.0002 mg/L ND 12-17-98 0.0002 mg/L ND 12-17-98 0.0005 mg/L ND 12-17-98 0.0005 mg/L 0.431 12-16-98

REPORT: 2489001MT (706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE : 12-28-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # : 24890.02

DATE SUBMITTED: 12-11-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #5S

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE					
INORGANICS										
TOTAL CYANIDE SULFATE	0.005 40	mg/L mg/L	ND 124	12-16-98 12-22-98	SW 9010 EPA 375.4					
METALS										
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005 0.010	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND 0.472 ND 0.259 ND 0.011	12-18-98 12-18-98 12-11-98 12-21-98 12-16-98 12-16-98 12-16-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010					

mg/L = PARTS PER MILLION(PPM)

ND = NOT DETECTED ABOVE REPORTING LIMIT



REPORT: 2489001MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

DATE : 12-28-98 ST. LOUIS, MO 63128

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

: 24890.03 ATAS #

DATE SUBMITTED: 12-11-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #5D

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE					
INORGANICS										
TOTAL CYANIDE SULFATE	0.005 10	mg/L mg/L	ND 35.9	12-16-98 12-22-98	SW 9010 EPA 375.4					
	METALS									
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND 2.97 ND 1.11 ND ND ND	12-18-98 12-18-98 12-11-98 12-21-98 12-16-98 12-16-98 12-16-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 6010 SW 7470 SW 6010					

mq/L = PARTS PER MILLION(PPM)

ND = NOT DETECTED ABOVE REPORTING LIMIT

## **ATAS** 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: O'BRIEN & GERE ENGINEERS, INC.

REPORT: 2489001MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128 DATE : 12-28-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # : 24890.04

DATE SUBMITTED: 12-11-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #9

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
TOTAL CYANIDE	0.005 100	INORO	GANICS ND 176	12-16-98 12-22-98	SW 9010 EPA 375.4
			TALS		
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005 0.010	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND 10.1 ND 0.701 ND ND 0.013	12-18-98 12-18-98 12-11-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010

mg/L = PARTS PER MILLION(PPM)

ND = NOT DETECTED ABOVE REPORTING LIMIT

REPORT: 2489001MT (706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE : 12-28-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER : 24890.05 ATAS #

DATE SUBMITTED: 12-11-98

: #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI PROJECT

SAMPLE ID : GMW #10

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE					
-		INOR	GANICS							
TOTAL CYANIDE SULFATE	0.005	mg/L mg/L	ND 1.2	12-16-98 12-22-98	SW 9010 EPA 375.4					
	METALS									
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND ND ND ND ND ND	12-18-98 12-18-98 12-11-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010					

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

ATTN: WILLIAM E. WRIGHT

REPORT: 2489001MT (706)

DATE : 12-28-98

## QA/QC

DESCRIPTION		PARAMETER	RESULTS	
w	,	, :		1-
METHOD BLANK	12-16-98	TOTAL CYANIDE	<0.005	mg/L
METHOD BLANK	12-22-98	SULFATE	<10	mg/L
METHOD BLANK	12-18-98	CADMIUM	<0.005	mg/L
METHOD BLANK	12-18-98	CHROMIUM	<0.005	mg/L
METHOD BLANK	12-11-98	HEXAVALENT CHROMIUM	<0.05	mg/L
METHOD BLANK	12-21-98	IRON	<0.05	mg/L
METHOD BLANK	12-15-98	LEAD	<0.002	mg/L
METHOD BLANK	12-15-98	MANGANESE	<0.005	mg/L
METHOD BLANK	12-17-98	MERCURY	<0.0002	mg/L
METHOD BLANK	12-15-98	NICKEL	<0.005	mg/L
METHOD BLANK	12-15-98	ZINC	<0.010	mg/L
COMMPOI CRIVE	10 16 00	MOMAL GVANIDE	87 %	RECOVERY
CONTROL SPIKE	12-16-98	TOTAL CYANIDE		RECOVERY
CONTROL SPIKE	12-22-98	SULFATE		
CONTROL SPIKE	12-18-98	CADMIUM	96 %	RECOVERY
CONTROL SPIKE	12-18-98	CHROMIUM	99 %	RECOVERY
CONTROL SPIKE	12-11-98	HEXAVALENT CHROMIUM	100 %	RECOVERY
CONTROL SPIKE	12-21-98	IRON	101 %	RECOVERY
CONTROL SPIKE	12-15-98	LEAD	98 %	RECOVERY
CONTROL SPIKE	12-15-98	MANGANESE	94 %	RECOVERY
CONTROL SPIKE	12-17-98	MERCURY	102 %	RECOVERY
CONTROL SPIKE	12-15-98	NICKEL	97 %	RECOVERY
CONTROL SPIKE	12-15-98	ZINC	96 %	RECOVERY

## AMERICAN TECHNICAL & ANALYTICAL SERVICES, INC.

875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

December 23, 1998

DEC 2 8 1998

O'BRIEN & GERE ENGINEERS, INC.

William E. Wright O'Brien & Gere Engineers, Inc. 5000 Cedar Plaza Parkway St. Louis, MO 63128

RE: ATAS #24875.01-#24875.06

#3050.005 - Inland Realty Co, Maryville, Missouri

Dear Mr. Wright:

Enclosed are the analytical reports for the samples received in our laboratory on December 10, 1998.

If, in your review, you should have any questions or require additional information, please call me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Ruseal Brewer Project Manager

**Enclosures** 

RB/jp

REPORT: 2487501MT (706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

DATE : 12-23-98 ST. LOUIS, MO 63128

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # : 24875.01 DATE SUBMITTED: 12-10-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #2S

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE		
INORGANICS							
TOTAL CYANIDE SULFATE	0.005 200	mg/L mg/L	0.015 564	12-16-98 12-22-98	SW 9010 EPA 375.4		
		MET	TALS				
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY	0.005 0.005 0.05 0.05 0.002 0.005 0.0002	mg/L mg/L mg/L mg/L mg/L mg/L	ND ND ND 2.41 ND 1.75 ND	12-11-98 12-11-98 12-10-98 12-21-98 12-16-98 12-16-98 12-17-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 6010 SW 7470		
NICKEL ZINC	0.005	mg/L mg/L	0.008 ND	12-16-98 12-16-98	SW 6010 SW 6010		

mg/L = PARTS PER MILLION(PPM)

ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS

CLIENT: O'BRIEN & GERE ENGINEERS, INC.

REPORT:

2487501MT (706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE :

12-23-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX :

WATER

ATAS #

24875.02

DATE SUBMITTED: 12-10-98

PROJECT

: #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID

: GMW #2D

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE		
INORGANICS							
TOTAL CYANIDE SULFATE	0.005 50	mg/L mg/L	ND 165	12-16-98 12-22-98	SW 9010 EPA 375.4		
METALS							
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND 7.77 ND 0.572 ND ND ND	12-11-98 12-11-98 12-10-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010		



ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: O'BRIEN & GERE ENGINEERS, INC.

REPORT: 2487501MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE : 12-23-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # : 24875.03

DATE SUBMITTED: 12-10-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #3

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE			
INORGANICS								
TOTAL CYANIDE SULFATE	0.005 100	mg/L mg/L	ND 246	12-16-98 12-22-98	SW 9010 EPA 375.4			
METALS								
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	0.019 ND ND 13.9 ND 1.01 ND ND 0.020	12-11-98 12-11-98 12-10-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98	SW 6010 SW 7196 SW 6010 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010			

REPORT: 2487501MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE: 12-23-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

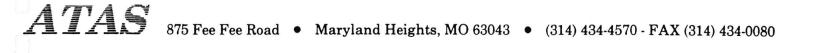
ATAS # : 24875.04

DATE SUBMITTED: 12-10-98

: #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI PROJECT

SAMPLE ID : GMW #3S

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE			
		INOR	GANICS		a.			
TOTAL CYANIDE SULFATE	0.005	mg/L mg/L	0.047 517	12-16-98 12-22-98	SW 9010 EPA 375.4			
	METALS							
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND 0.227 ND 0.407 ND 0.005 ND	12-11-98 12-11-98 12-10-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010			



REPORT: 2487501MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

DATE : 12-23-98

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # : 24875.05 DATE SUBMITTED: 12-10-98

PROJECT : #3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI

SAMPLE ID : GMW #3D

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE
		INOR	GANICS		
TOTAL CYANIDE SULFATE	0.005 50	mg/L mg/L	ND 131	12-16-98 12-22-98	SW 9010 EPA 375.4
		MET	TALS	¥	
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005 0.010	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND 7.62 ND 0.551 ND ND 0.013	12-11-98 12-11-98 12-10-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010



2487501MT (706) REPORT:

12-23-98

DATE

5000 CEDAR PLAZA PARKWAY, SUITE 211

ST. LOUIS, MO 63128

ATTN: WILLIAM E. WRIGHT

SAMPLE MATRIX : WATER

ATAS # 24875.06

DATE SUBMITTED: 12-10-98

#3050.005 - INLAND REALTY CO, MARYVILLE, MISSOURI PROJECT

SAMPLE ID : GMW #4D

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE ANALYZED	METHOD REFERENCE			
			GANICS	10.15.00	GW 0010			
TOTAL CYANIDE SULFATE	0.005 200	mg/L mg/L	ND 346	12-16-98 12-22-98	SW 9010 EPA 375.4			
	METALS							
CADMIUM CHROMIUM HEXAVALENT CHROMIUM IRON LEAD MANGANESE MERCURY NICKEL ZINC	0.005 0.005 0.05 0.05 0.002 0.005 0.0002 0.005	mg/L mg/L mg/L mg/L mg/L mg/L mg/L	ND ND ND 11.7 ND 1.22 ND ND ND	12-11-98 12-11-98 12-10-98 12-21-98 12-16-98 12-16-98 12-17-98 12-16-98 12-16-98	SW 6010 SW 6010 SW 7196 SW 6010 SW 6010 SW 6010 SW 7470 SW 6010 SW 6010			



875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: O'BRIEN & GERE ENGINEERS, INC.

REPORT:

2487501MT(706)

5000 CEDAR PLAZA PARKWAY, SUITE 211 ST. LOUIS, MO 63128

DATE : 12-23-98

ATTN: WILLIAM E. WRIGHT

#### QA/QC

DESCRIPTION		PARAMETER	RESULTS	
METHOD BLANK	12-16-98	TOTAL CYANIDE	<0.005	mg/L
METHOD BLANK	12-22-98	SULFATE	<10	mg/L
METHOD BLANK	12-11-98	CADMIUM	<0.005	mg/L
METHOD BLANK	12-11-98	CHROMIUM	<0.005	mg/L
METHOD BLANK	12-10-98	HEXAVALENT CHROMIUM	<0.05	mg/L
METHOD BLANK	12-21-98	IRON	<0.05	mg/L
METHOD BLANK	12-15-98	LEAD	<0.005	mg/L
METHOD BLANK	12-15-98	MANGANESE	<0.005	mg/L
METHOD BLANK	12-17-98	MERCURY	<0.0002	mg/L
METHOD BLANK	12-15-98	NICKEL	<0.010	mg/L
METHOD BLANK	12-15-98	ZINC	<0.010	mg/L
CONTROL SPIKE	12-16-98	TOTAL CYANIDE	87 %	RECOVERY
CONTROL SPIKE	12-22-98	SULFATE	101 %	RECOVERY
CONTROL SPIKE	12-11-98	CADMIUM	99 %	RECOVERY
CONTROL SPIKE	12-11-98	CHROMIUM	100 %	RECOVERY
CONTROL SPIKE	12-10-98	HEXAVALENT CHROMIUM	100 %	RECOVERY
CONTROL SPIKE	12-21-98	IRON	96 %	RECOVERY
CONTROL SPIKE	12-15-98	LEAD	98 %	RECOVERY
CONTROL SPIKE	12-15-98	MANGANESE	94 %	RECOVERY
CONTROL SPIKE	12-17-98	MERCURY	102 %	RECOVERY
CONTROL SPIKE	12-15-98	NICKEL	97 %	RECOVERY
CONTROL SPIKE	12-15-98	ZINC	96 %	RECOVERY

#### O'BRIEN & GERE ENGINEERS, INC.

Office: St. Louis, MO

Address: 5000 Cedar Plaza Parkway

Phone: <u>(314)</u> 842-4550

Job No. <u>3050.005</u> Sheet of #

Time

Time

Time

Date

Date

Date

CHAIN OF CUSTODY

Client: INLA Location: MA				•	Collected By: (Signature)  (Signature)			
SAMPLE DES	CRIPTION	BK Date	Time	Sample Matrix ¹	Sample Type ²	No. of Containers	ANALYSIS REQUESTED	
GMW #4#7 5	24840,61	12/10/98	1330	Water	Grab	1-P, 500 mL	Cyanide (CN)	
GMW #4# S	1	11/10/98	1330	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)	
GMW #4/1/ S		12/10/98	1330	Water	Grab	1-P, 500 mL	Hexavalent chromium (Crv) Sulfale	
GMW #4 <b>;</b> S	1	12/10/98	1330	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni), Fe	
GMW #5S	02	12/10/18	1145	Water	Grab	1-P, 500 mL	CN	
GMW #5S		12/10/98	1145	Water	Grab	1-P, 500 mL	Total Pb and Zn	
GMW #5S		12/10/98	1145	Water	Grab	1-P, 500 mL	Crvi Salfates	
GMW #5S		12/10/98	1145	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni, Fe	
GMW #5D	岁	12/10/98	1230	Water	Grab	1-P, 500 mL	CN	
GMW #5D		12/10/98	1230	Water	Grab	1-P, 500 mL	Total Pb and Zn	
GMW #5D		12/10/98	1230	Water	Grab	1-P, 500 mL	cry Sulfales	
GMW #5D	VV	12/10/98	1230	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni, Fe	
Maximum Metho	d Detection Li	mits: CN, Cd,	Cr, Mn, Ni	i - 5 ppb; Pb	- 2 ppb; Hg - 0	.2 ppb; Zn - 10 ppl		

¹Matrix = water, wastewater, air, sludge, sediment, etc.

Relinquished

by:__

of:

Chemical Preservatives:

Metals - HNO, to pH 2
Cyanide - NaOH to pH 12
CrvI - Mone
Sulfaless - None

12-11-78 of: Relinquished Date Time Received Date Time by: by: of: Relinquished Date Time Received Date Time by: by:___

Time

Date

of: of:

Use this space if shipped via courier (e.g., Fed Date Time Co

Ex)
Relinquished by: Millians April 1

"DBrund Jere 19/4 8/645

*Attach delivery/courier receipt to Custody

Relinquished Date Time by:

Received by:

of:

²Type = grab, composite

³Containers = P - polyethylene; G - glass

### O'BRIEN & GERE ENGINEERS, INC.

Office: St. Louis, MO

Address: 5000 Cedar Plaza Parkway

Phone: _(314) 842-4550

Job No. 3050.005 Sheet of 5

CHAIN OF CUSTODY

Client: INLAND Location: MARY					Collected By: (Signature) Millians E-Ms of							
SAMPLE DESCR	- /	Date	Time	Sample Matrix ¹	Sample Type ²	No. of Containers ³	ANALYSIS REQUESTED					
GMW #9 248	10.04	12/10/98	1035	Water	Grab	1-P, 500 mL	Cyanide (CN)					
GMW #9	-	12/10/98	1035	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)					
GMW #9		12/10/98	215	Water	Grab	1-P, 500 mL	Hexavalent chromium (Crv) Su/fates					
GMW #9	V	12/10/98	1035	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni), Iron (fe)					
							//=					
							-					
1												
Maximum Method De	Maximum Method Detection Limits: CN, Cd, Cr, Mn, Ni - 5 ppb; Pb - 2 ppb; Hg - 0.2 ppb; Zn - 10 ppb											

'Matrix = water, wastewater, air, sludge, sediment, etc.	'Matrix =	water,	wastewater.	air.	sludge.	sediment	etc	
----------------------------------------------------------	-----------	--------	-------------	------	---------	----------	-----	--

³Containers = P - polyethylene; G - glass

Chemical Preservatives:

Metals - HNO, to pH 2 Cyanide - NaOH to pH 12

CrvI - none Sultates - none

Relinquished by:	Date	Time	Received by 3°C	Date	Time
of:		* 4	of: ATAS	1Z-1190	1350
Relinquished by:	Date	Time	Received by:	Date	Time
of:	<u> </u>		of:		
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		
Use this space if shipped via courier (e.g., Fed Ex) Relinquished by:	Date	Time	Courier Ed EC	Date	Time
of: ) Brun & Leve	17/1/98	1685	*Attach delivery/courier receipt to Chain of Custody	10/s/ 198)	145
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		

²Type = grab, composite

#### O'BRIEN & GERE ENGINEERS, INC.

Office: St. Louis, MO

Address: 5000 Cedar Plaza Parkway

Phone: (314) 842-4550

Job No. _3050.005 Sheet 4 of 3

CHAIN OF CUSTODY

Client: INLAND REALT Location: MARYVILLE,	MISSOURI			Collected By: (Signature) Milliam E. Mark							
SAMPLE DESCRIPTION	SAMPLE DESCRIPTION Date Time			Sample Type ²	Mo. of Containers ³	ANALYSIS REQUESTED					
GMW #10 24890.05	12/10/98	1355	Water	Grab	1-P, 500 mL	Cyanide (CN)					
GMW #10	12/10/98	1355	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)					
GMW #10	12/10/98	1355	Water	Grab	1-P, 500 mL	Hexavalent chromium (CrVI), Sulfake					
GMW #10	12/10/98	1355	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni), Icon					
						i					
Maximum Method Detection Lin	Maximum Method Detection Limits: CN, Cd, Cr, Mn, Ni - 5 ppb; Pb - 2 ppb; Hg - 0.2 ppb; Zn - 10 ppb										

¹Matrix = water, wastewater, air, sludge, sediment, etc.

²Type = grab, composite

³Containers = P - polyethylene; G - glass

Chemical Preservatives:

Metals - HNO, to pH 2
Cyanide - NaOH to pH 12
Cy VI - None
Sulfales - None

Relinquished by:	Date	Time	Received by:-	Date	Time
of:		** *	of: AJA)	4-11-98	0851
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		
Use this space if shipped via courier (e.g., Fed Ex) Relinguished by:	Date	Time	Courier Fedex	Date	Time
of: Brien & Gere	12/10/98	165	9719801994 *Attach delivery/courier veceipt to Chain of Custody	12/14	165
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		

#### BRIEN & GERE NGINEERS, INC.

ice: St. Louis, MO

dress: 5000 Cedar Plaza Parkway

hone: _(314) 842-4550

Job No. <u>3050.005</u> Sheet <u>1</u> of <u>@</u>

THE PROPERTY OF THE PROPERTY O

CHAIN OF CUSTODY

lient: INLAND REALT Location: MARYVILLE,				Collected By: (Signature)		
SAMPLE DESCRIPTION	Date	Time	Sample Matrix ¹	Sample Type ²	No. of Containers ³	ANALYSIS REQUESTED
~MW #2S	12/9/98	1041)	Water	Grab	1-P, 500 mL	Cyanide (CN)
MW #2S	1219198	1040	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)
GMW #2S	12/9/98	17.25	Water	Grab	1-P, 500 mL	Hexavalent chromium (Crv1), Sulfaks
MW #2S	12/9/98	1040	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni) I con (Fe)
MW #2D	12/9/98	1940	Water	Grab	1-P, 500 mL	CN
MW #2D	12/9/98	0940	Water	Grab	1-P, 500 mL	Total Pb and Zn
3MW #2D	12/9/98	1240	Water	Grab	1-P, 500 mL	crvi / Sulfates
MW #2D	12/9/98	0940	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni, Fe
3MW #3,	12/9/98	1215	Water	Grab	1-P, 500 mL	CN
ЛW #3	12/9/98	1215	Water	Grab	1-P, 500 mL	Total Pb and Zn
3MW #3	12/9/98	1215	Water	Grab	1-P, 500 mL	cru, Sulfates
1W #3	12/9/98	1215	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Nif-e
faximum Method Detection Lim	nits: CN, Cd, (	Cr, Mn, Ni	- 5 ppb; Pb -	2 ppb; Hg - 0	.2 ppb; Zn - 10 ppb	)

³Containers = P - polyethylene; G - glass

Chemical Preservatives:

Metals - HNO, to pH 2
Cyanide - NaOH to pH 12
Cr VI - None
Sy Fafes - None

telinquished	Date	Time	Received by:-	Date	Time
			of:		
inquished	Date	Time	Received by:	Date	Time
<u>f:</u> ' .	,		of:		
inquished	Date	Time	Received by:	Date	Time
c.	ā		of:		
this space if shipped via courier (e.g., Fed x)  inquished-y	Date	Time	Courier Feel EX	Date	Time
Briend Gere	13/9/8	1845	•Attach delivery/courier receipt to Chain of Custody	12/9/98	1895
:linquished	Date	Time	Received by:	Date	Time
			of:		

¹Matrix = water, wastewater, air, sludge, sediment, etc. ²Type = grab, composite

#### O'BRIEN & GERE ENGINEERS, INC.

Office: St. Louis, MO

Address: 5000 Cedar Plaza Parkway

Phone: _(314) 842-4550

Job No. _3050.0u Sheet 2 of

CHAIN OF CUSTODY

Client: INLANI Location: MAR				0.000	Collected By: (Signature)						
SAMPLE DESCI	SAMPLE DESCRIPTION Date Tir		Time	Sample Matrix ¹	Sample Type ²	No. of Containers ³	ANALYSIS REQUESTED				
GMW #38 248	(75.04	12/9/98	1345	Water	Grab	1-P, 500 mL	Cyanide (CN)				
GMW #3S		12/9/98	1345	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)				
GMW #3S		12-19/98	1345	Water	Grab	1-P, 500 mL	Hexavalent chromium (Crvi), Su fat				
GMW #3S	1	12/9/98	1345	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni),				
GMW #3D	05	12/9/98	1430	Water	Grab	1-P, 500 mL	CN				
GMW #3D		179/98	1430	Water	Grab	1-P, 500 mL	Total-Pb and Zn				
GMW #3D		12/9/98	1430	Water	Grab	1-P, 500 mL	Crv Sulfates				
GMW #3D	V	12/9/98	1430	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni, Fe				
GMW #4 1)	06	12/9/98	1545	Water	Grab	1-P, 500 mL	CN				
GMW #4 <b>\$</b> ()		12/9/48	1545	Water	Grab	1-P, 500 mL	Total Pb and Zn				
GMW #4# ()		12/9/98	1545	Water	Grab	1-P, 500 mL	crvi Salfates				
GMW #4 <b>#</b> ♪		12/9/98	1545	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni, Fe				
Maximum Method I	Maximum Method Detection Limits: CN, Cd, Cr, Mn, Ni - 5 ppb; Pb - 2 ppb; Hg - 0.2 ppb; Zn - 10 ppb										

¹Matrix = water, wastewater, air, sludge, sediment, etc.

²Type = grab, composite

³Containers = P - polyethylene; G - glass

Chemical Preservatives:

Metals - HNO, to pH 2
Cyanide - NaOH to pH 12
Cr VI - Mon &
Sulfates - None

			Juitales- 404 E		
Relinquished by:	Date	Time	Received by:- Marking	Date	Time
of:		* 4	of: ATAS 5°C	12/10/98	0912
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		
Use this space if shipped via courier (e.g., Fed Ex) Relinquished by:	Date	Time	Courier FELL CX	Date	Time
of: Brien & Lere Engineer	10/9/8	845	07/980/983 *Attach delivery/courier receipt to Chain of Custody	19/9	895
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		

3050,005 Newtorf-Lloyd 1998-N+D

## O'Brien & Gere Laboratories, Inc.

Client: O'Brien & Gere Engineers, Inc.

Project: Inland Realty Co.

Proj. Desc: Maryville, Missouri

Sample: K1931

Samp. Description: GMW #3DA

Units: mg/L

### **Analytical Results Trace Metals**

Job No.: 3435.016.015

Certification NY No.: 10155R

Collected: 12/09/98

Matrix: Water

Received: 12/10/98

%Solids:

Number of analytes: 8

Parameter	Result	Method	Prepared	Analyzed	QC Batch	Dilut. Note
Cadmium	<.005	200.7	12/16/98	12/18/98	121698W1	1
Chromium	.005	200.7	12/16/98	12/18/98	121698W1	1
Iron	7.1	200.7	12/16/98	12/18/98	121698W1	1
Lead	<.002	200.9	12/16/98	12/28/98	121698W1	1
Manganese	.53	200.7	12/16/98	12/18/98	121698W1	1 -
Mercury	<.0002	245.1	12/14/98	12/14/98	121498W1	1
Nickel	<.005	200.7	12/16/98	12/18/98	121698W1	1
Zinc	.01	200.7	12/16/98	12/18/98	121698W1	1

Notes:

J-Estimated value

Authorized: Monika Santucci
Date: December 28,1998 Monika Santucci

5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

## O'Brien & Gere Laboratories, Inc.

## **Analytical Results Wet Chemistry**

Client: O'Brien & Gere Engineers, Inc.

Project: Inland Realty Co.

Proj. Desc: Maryville, Missouri

Job No.: 3435.016.015

Certification NY No.: 10155R

Sample: K1931

Samp. Description: GMW #3DA

Collected: 12/09/98 14:30

Matrix: Water

Received: 12/10/98 08:50

Parameter	Result Units	Method	Prepared Analyzed	QC Batch Note
Chromium-Hexavalent	<.01 mg/L	7196A	12/10/98	121098W23
Sulfate	140. mg/L	EPA 375.4	12/28/98	122898W23
Total cyanide	<.005 mg/L	EPA 335.2	12/16/98 12/16/98	121698W21

Notes:

J-Estimated value

Authorized:_

Date: December 29,1998

Monika Santucci

5000 Brittonfield Parkway / Suite 300, Box 4942 / Syracuse, NY 13221 / (315) 437-0200

#### )'BRIEN & GERE ENGINEERS, INC.

Office: St. Louis, MO

ddress: 5000 Cedar Plaza Parkway

rhone: (314) 842-4550

NGH < Job No. <u>3050.005</u> Sheet 1 of 1

**CHAIN OF CUSTODY** 

Client: INLAND REALTY CO Location: MARYVILLE, MISSOURI			Collected By: (Signature) While Hard			
SAMPLE DESCRIPTION	Date	Time	Sample Matrix ¹	Sample Type ²	No. of Containers ³	ANALYSIS REQUESTED
GMW #3DA	1249/98	1430	Water	Grab	1-P, 500 mL	Cyanide (CN)
GMW #3DA	12/9/98	1430	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)
GMW #3DA	12/9/98	1430	Water	Grab	1-P, 500 mL	Hexavalent chromium (Cr ^{VI} )
GMW #3DA	12/9/98	1430	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni)
GMW#3DA	12/9/98	1430	Water	mah	250 ml	Sulfates
Maximum Method Detection Limits: CN, Cd, Cr, Mn, Ni - 5 ppb; Pb - 2 ppb; Hg - 0.2 ppb; Zn - 10 ppb						
Metrix — water water to be a similar to be a s						

¹Matrix = water, wastewater, air, sludge, sediment, etc.

²Type = grab, composite

³Containers = P - polyethylene; G - glass

Chemical Preservatives:

Metals - HNO₃ to pH 2
Cyanide - NaOH to pH 12
Cr VI - hone

			Sulfates - none.		
Relinquished by:	Date	Time	Received by:-	Date	Time
of:	3	Sec. 3.	of:		
Relinquished by:	Date	Time	Received by:	Date	Time
of:			of:		
Relinquished by:	Date	Time	Received by:	Date	Time
of:		u u	of:		
Use this space if shipped via courier (e.g., Fed Ex) Telinquished  Telinquished  Telinquished	Date	Time	Courier Felex	Date 17/9/40	Time
ot: Brien & Leve Engineer	13/9/98	1845	6719801972 *Attach delivery/courier receipt to Chain of Custody	- 4	1011
Relinquished	Date	Time	Received by: Marlo F. Jalsson	Date	Time
of:			of: OBrica + Gere LAWS	14,0/98	08:50

#### O'BRIEN & GERE ENGINEERS, INC.

Office: St. Louis, MO

Address: 5000 Cedar Plaza Parkway

Pnone: <u>(314)</u> 842-4550

Job No. <u>3050.06</u> Sheet <u>1</u> of

CHAIN OF CUSTODY

Client: INLAND REALTY CO Location: MARYVILLE, MISSOURI			Collected By: (Signature)				
SAMPLE DES	CRIPTION	Date	Time	Sample Matrix ¹	Sample Type ²	No. of Containers ³	ANALYSIS REQUESTED
GMW #28 2C	1875.01	12/9/98	1040	Water	Grab	1-P, 500 mL	Cyanide (CN)
GMW #2S	1	1219198	1040	Water	Grab	1-P, 500 mL	Total lead (Pb) and zinc (Zn)
GMW #2S		12/9/98	·	Water	Grab	1-P, 500 mL	Hexavalent chromium (Crvi), Sulfate
GMW #2S		12/9/98	1040	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, mercury (Hg), manganese (Mn), Nickel (Ni) Iron (Fe)
GMW #2D	m	12/9/98	0940	Water	Grab	1-P, 500 mL	CN CN
GMW #2D		12/9/98	0940	Water	Grab	1-P, 500 mL	Total Pb and Zn
GMW #2D		12/9/98	1240	Water	Grab	1-P, 500 mL	crv / Sulfales
GMW #2D	1	12/9/98	0940	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni
GMW #3	13	12/9/98	1215	Water	Grab	1-P, 500 mL	CN CN
GMW #3		12/9/98	1215	Water	Grab	1-P, 500 mL	Total Pb and Zn
GMW #3		12/9/98	1215	Water	Grab	1-P, 500 mL	cru, Sulfates
GMW #3	VV	12/9/98	1215	Water	Grab	1-P, 1 L	Total Metals-Cd, Cr, Hg, Mn, Ni, Fe
Maximum Method Detection Limits: CN, Cd, Cr, Mn, Ni - 5 ppb; Pb - 2 ppb; Hg - 0.2 ppb; Zn - 10 ppb							

¹Matrix = water, wastewater, air, sludge, sediment, etc.

²Type = grab, composite

³Containers = P - polyethylene; G - glass

Chemical Preservatives:

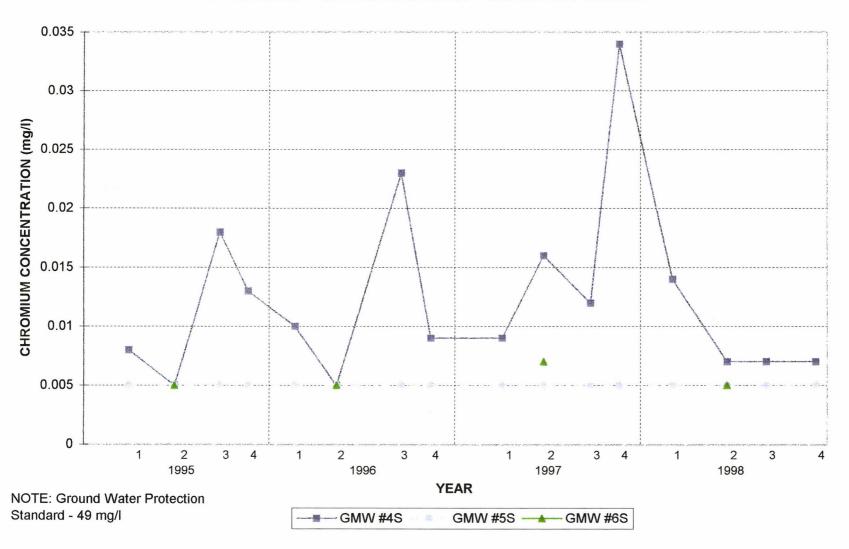
Metals - HNO, to pH 2 Cyanide - NaOH to pH 12 Cr VI - None Sy fafes - None

Relinquished Date Time Received by:-Time Date by:__ 12/11/98 5°C of: 2912 Relinquished Date Received Time Date Time by:_ by:_ of: Relinquished Date Time Received Date Time by:_ by:__ of: of: Use this space if shipped via courier (e.g., Fed Date Courier Time Time Ex) Relinquished-// Custody Relinquished Date Time Received Date Time by:_ by:_ of: of:

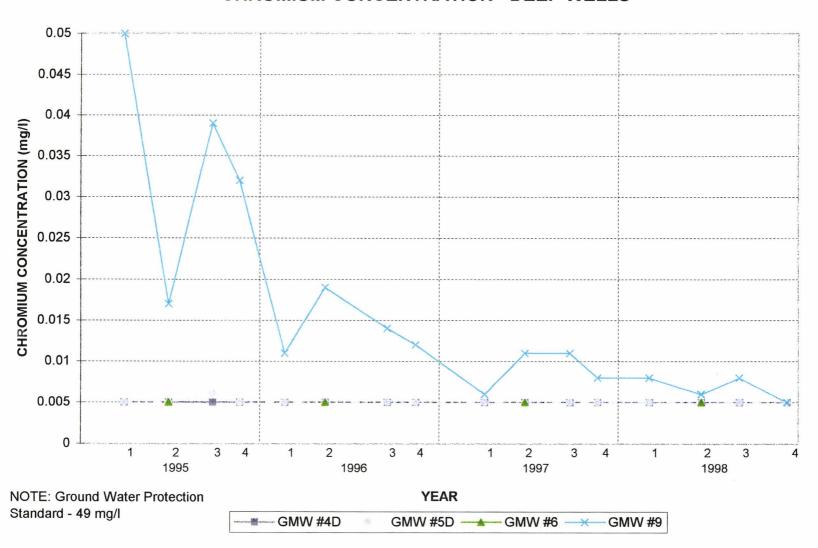
Appendix C

Concentration trend graphs 1995-1998

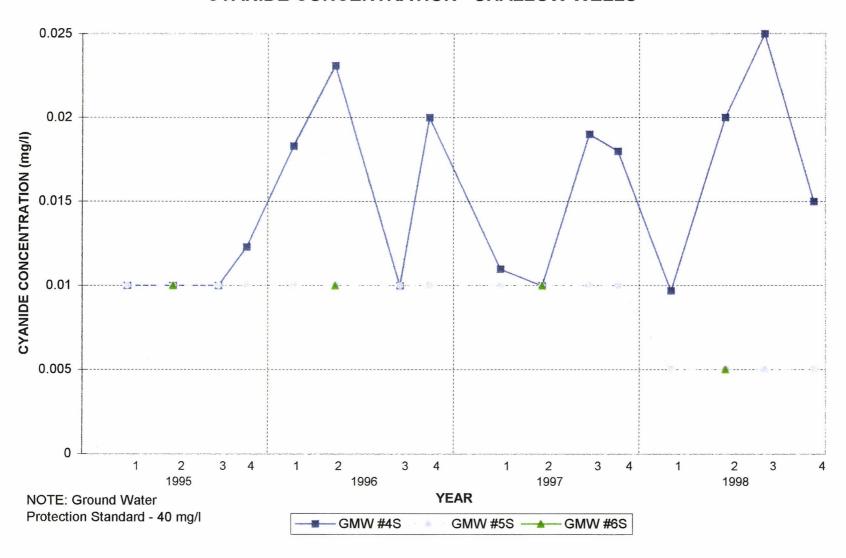
**CHROMIUM CONCENTRATION - SHALLOW WELLS** 



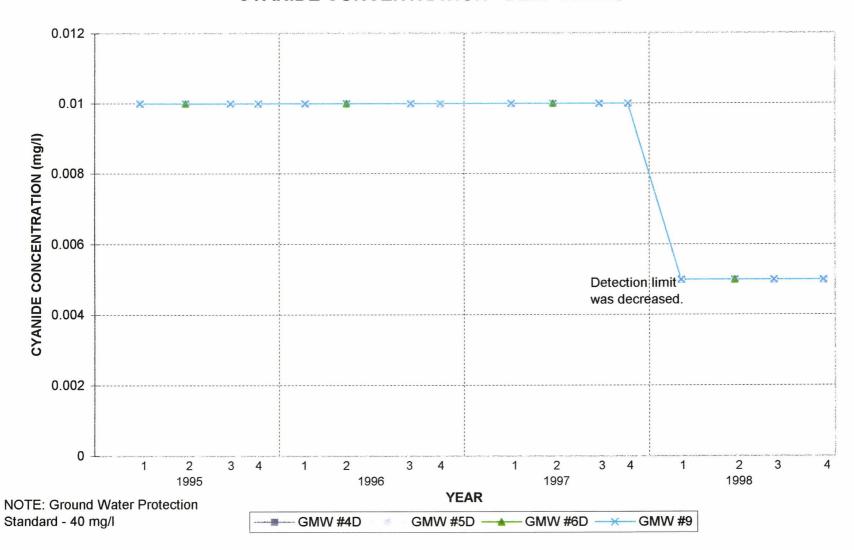
**CHROMIUM CONCENTRATION - DEEP WELLS** 



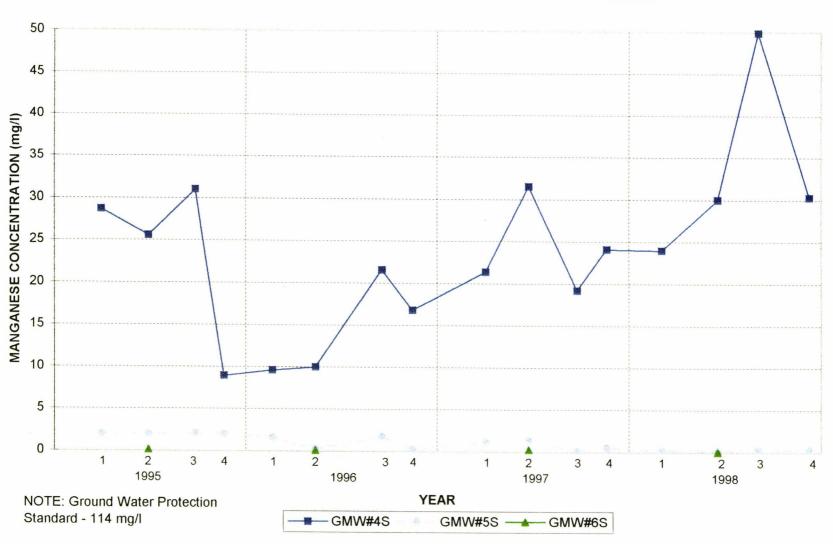
**CYANIDE CONCENTRATION - SHALLOW WELLS** 



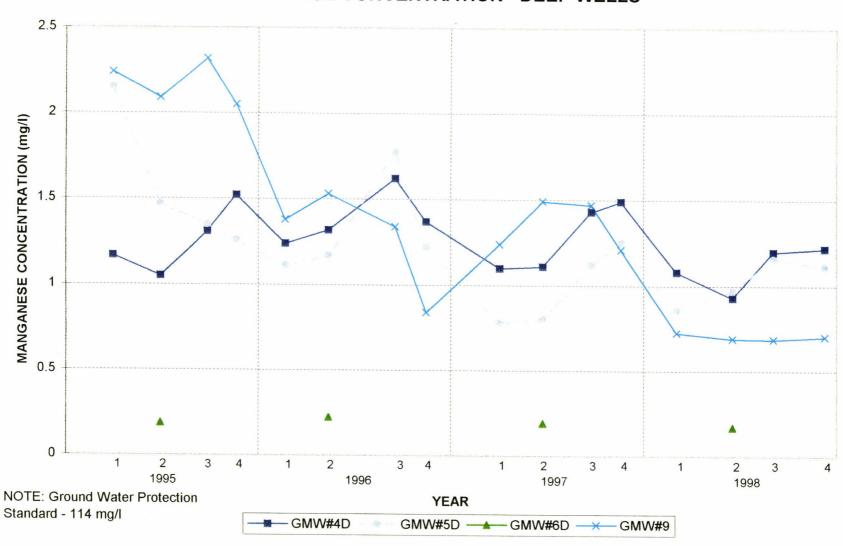
**CYANIDE CONCENTRATION - DEEP WELLS** 



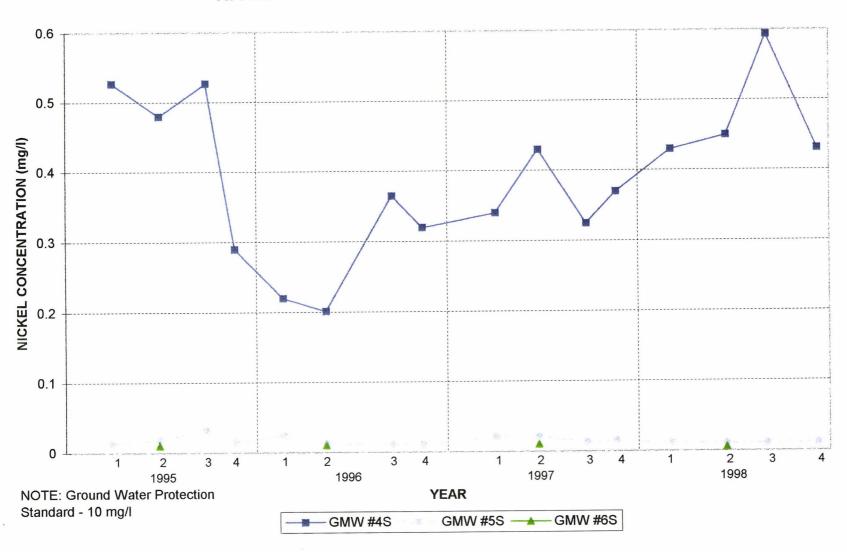
**MANGANESE CONCENTRATION - SHALLOW WELLS** 



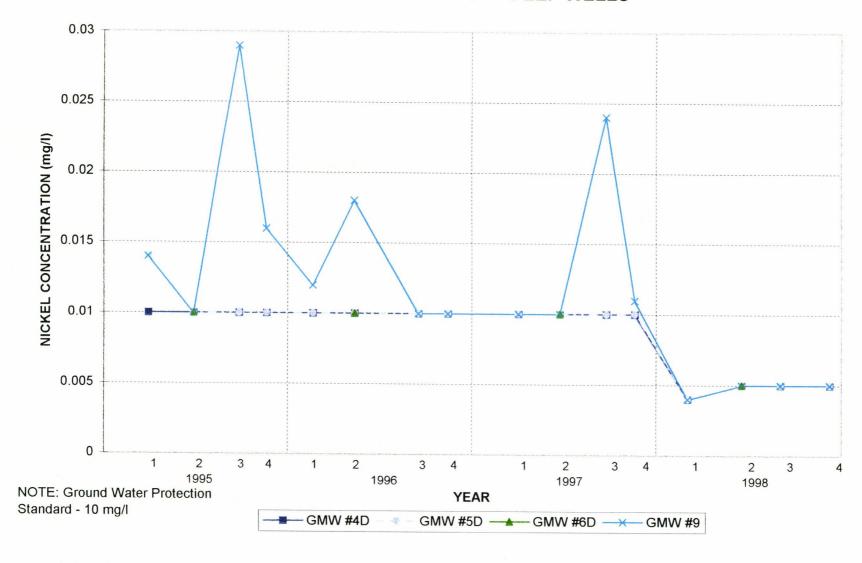
**MANGANESE CONCENTRATION - DEEP WELLS** 



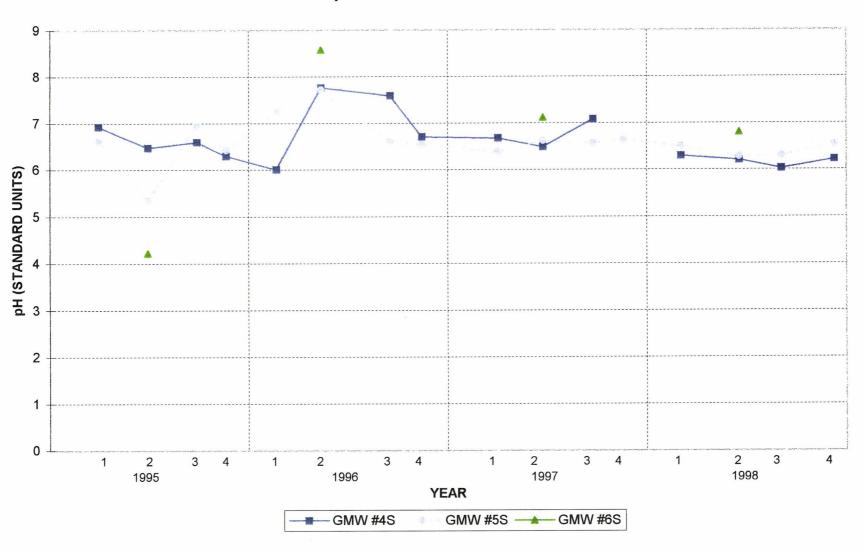
NICKEL CONCENTRATION - SHALLOW WELLS



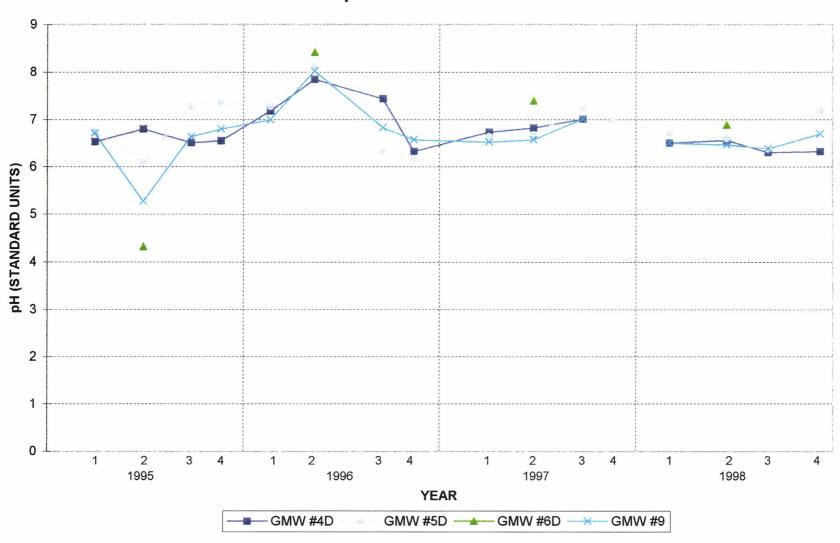
**NICKEL CONCENTRATION - DEEP WELLS** 



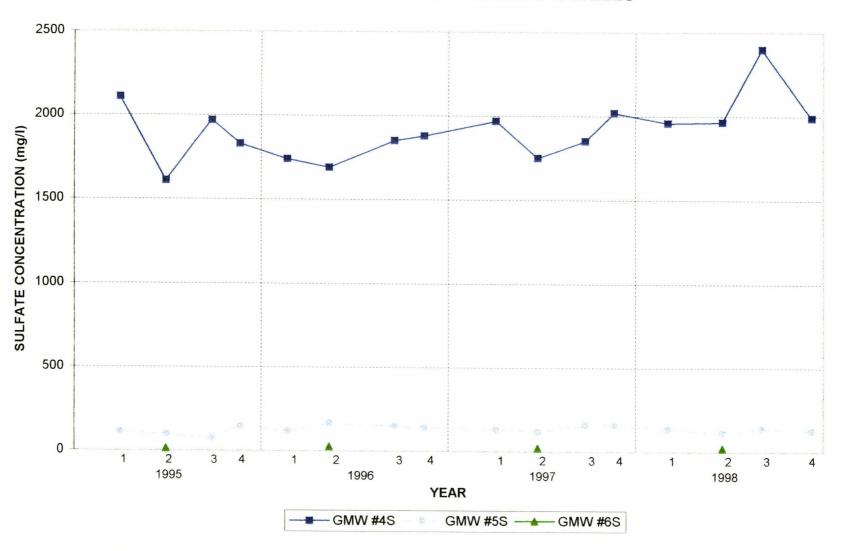
pH - SHALLOW WELLS



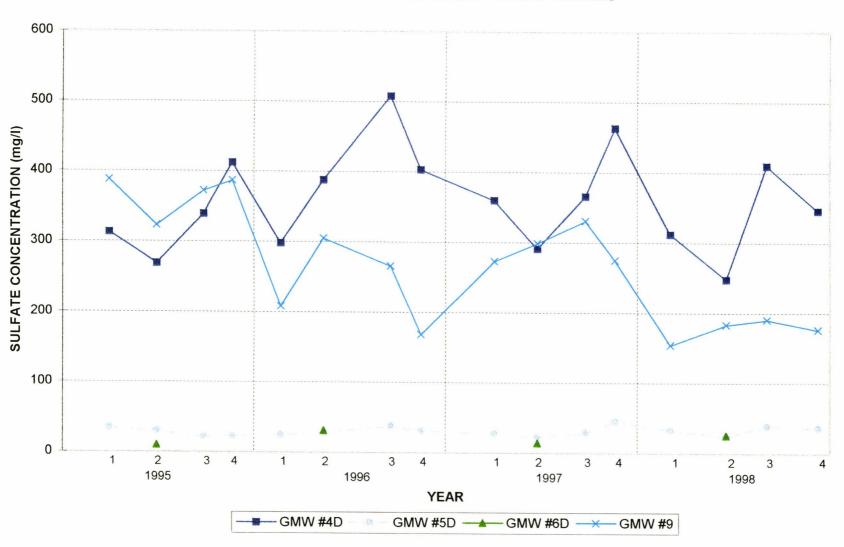
pH - DEEP WELLS



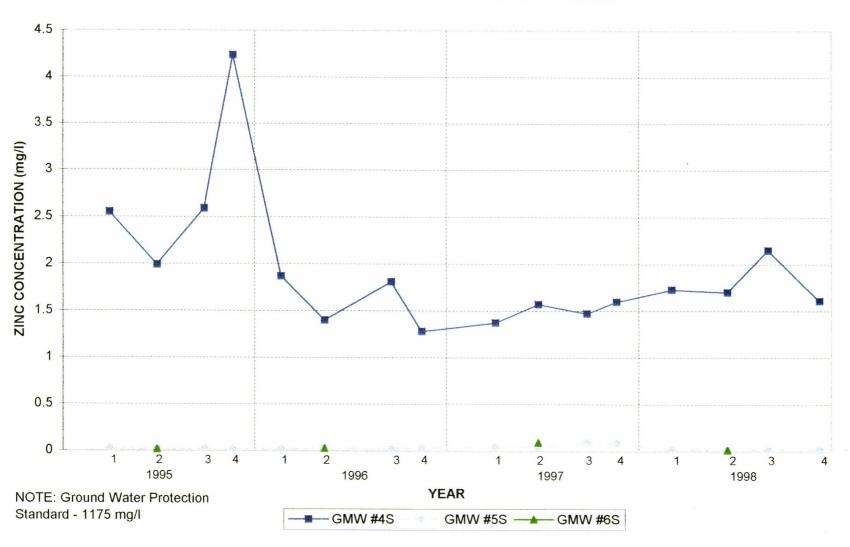
# INLAND REALTY - MARYVILLE, MISSOURI SULFATE CONCENTRATION - SHALLOW WELLS



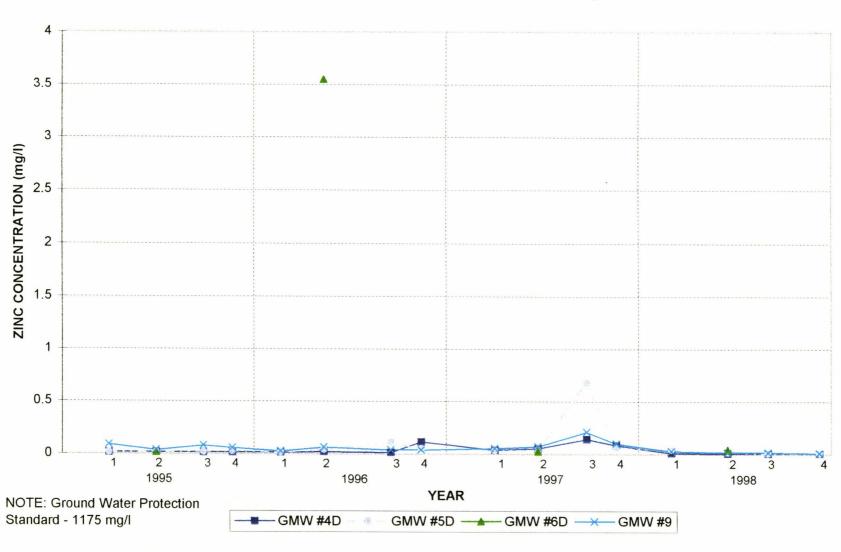
**SULFATE CONCENTRATION - DEEP WELLS** 



**ZINC CONCENTRATION - SHALLOW WELLS** 

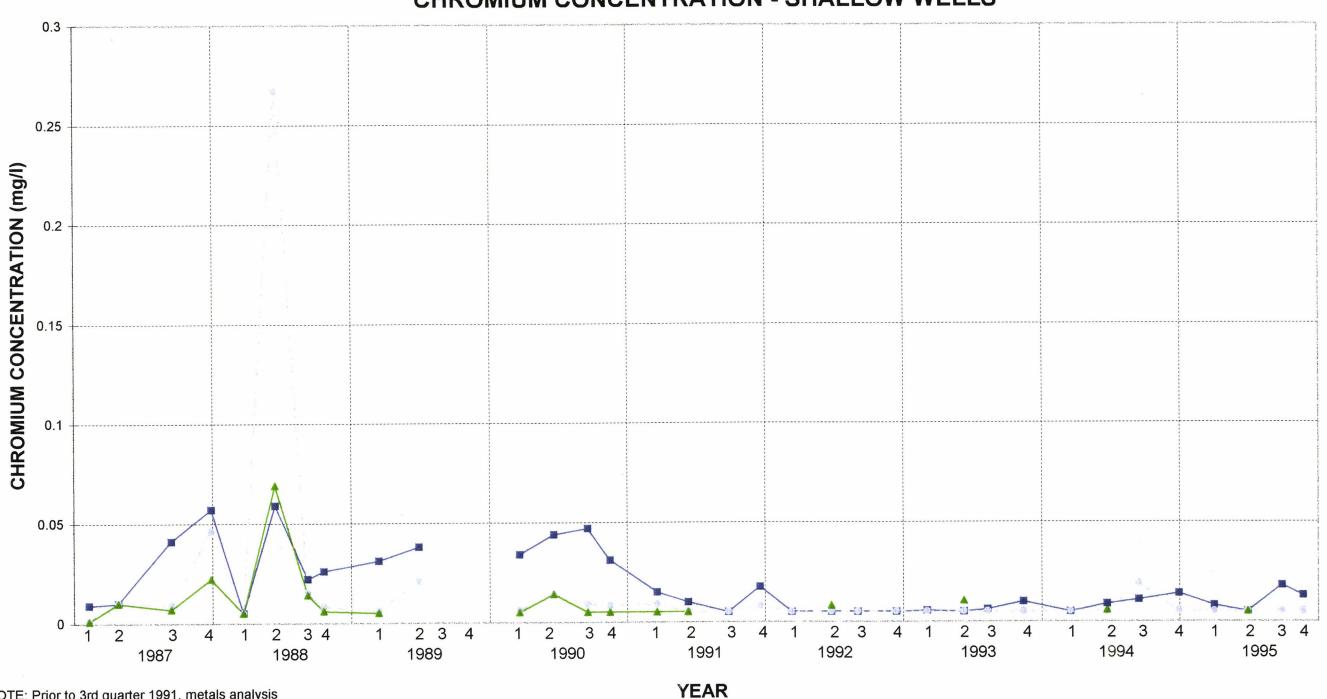


**ZINC CONCENTRATION - DEEP WELLS** 



Concentration trend graphs 1987-1995

**CHROMIUM CONCENTRATION - SHALLOW WELLS** 

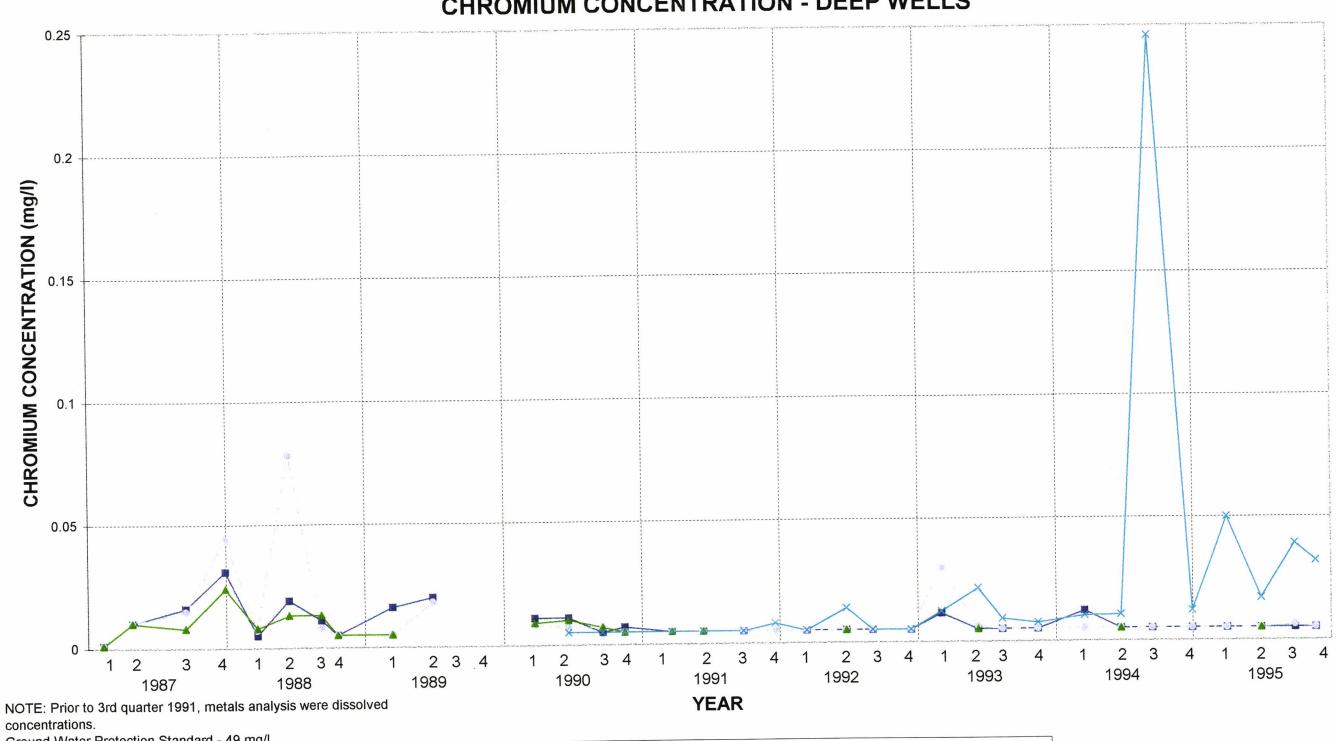


NOTE: Prior to 3rd quarter 1991, metals analysis were dissolved concentrations.

Ground Water Protection Standard - 49 mg/l

■ GMW #4S ■ GMW #5S — GMW #6S

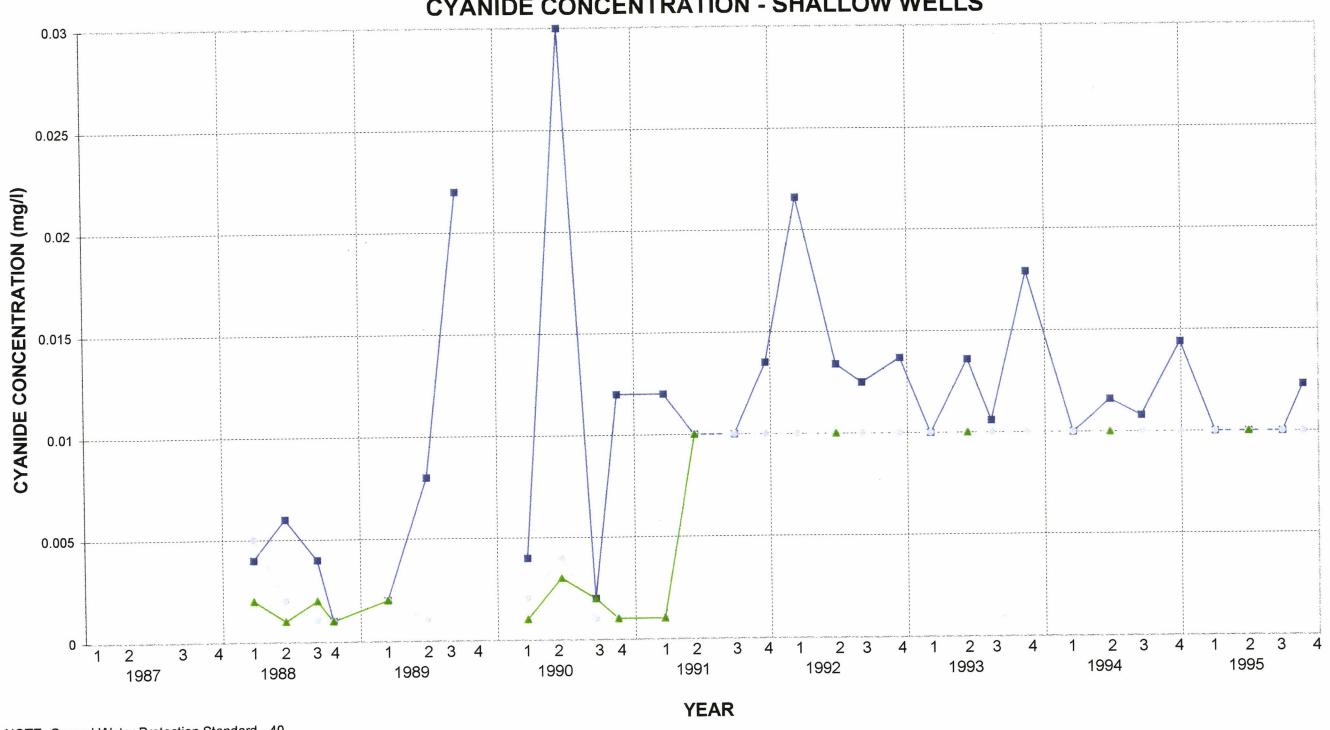
**CHROMIUM CONCENTRATION - DEEP WELLS** 



Ground Water Protection Standard - 49 mg/l

GMW #5D → GMW #6D → GMW #9 ■ GMW #4D

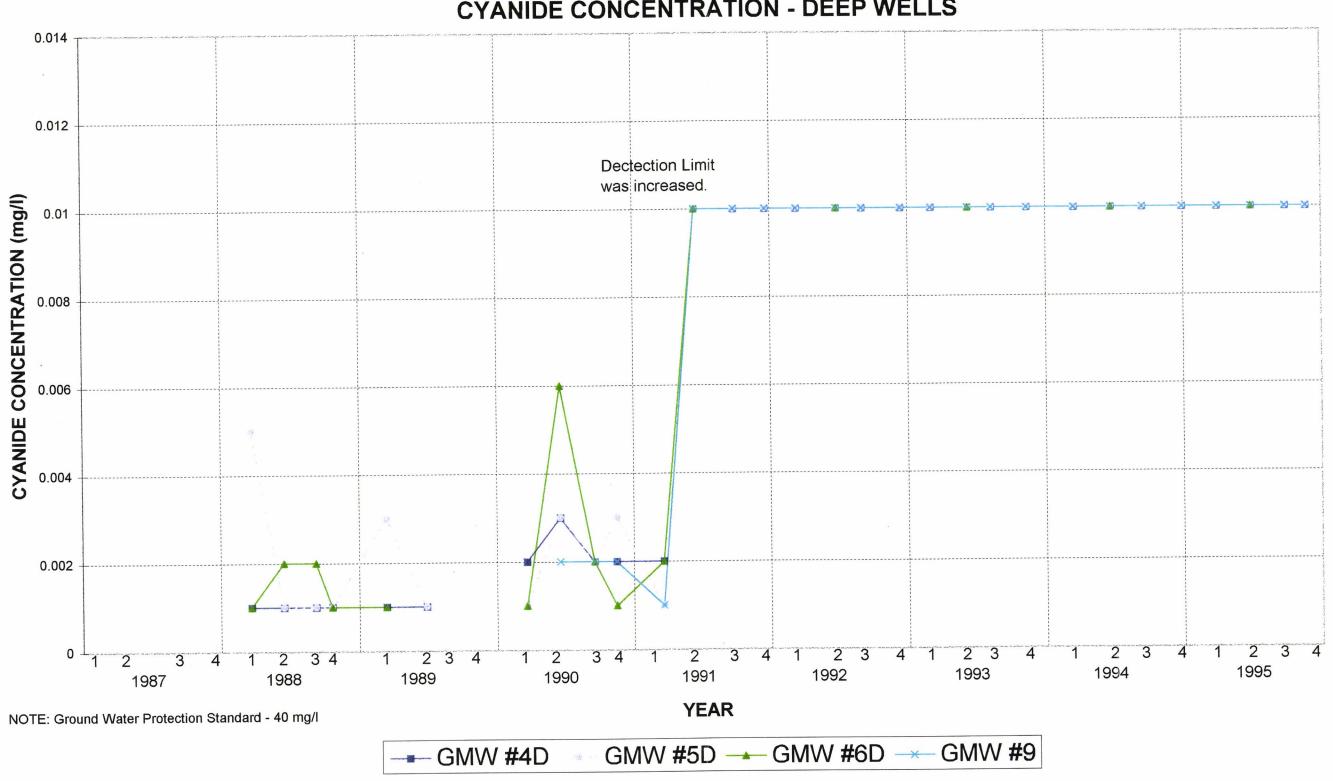
**CYANIDE CONCENTRATION - SHALLOW WELLS** 



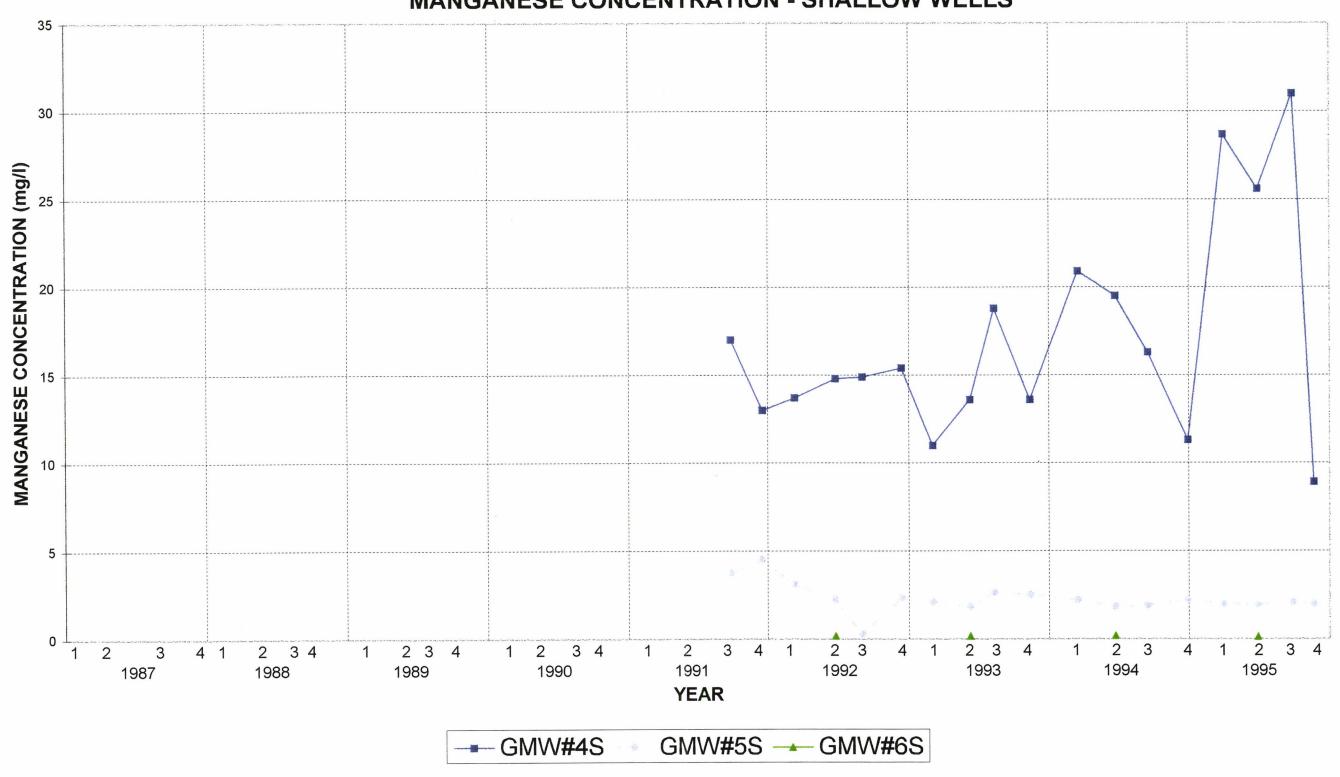
NOTE: Ground Water Protection Standard - 40

GMW #5S → GMW #6S --- GMW #4S

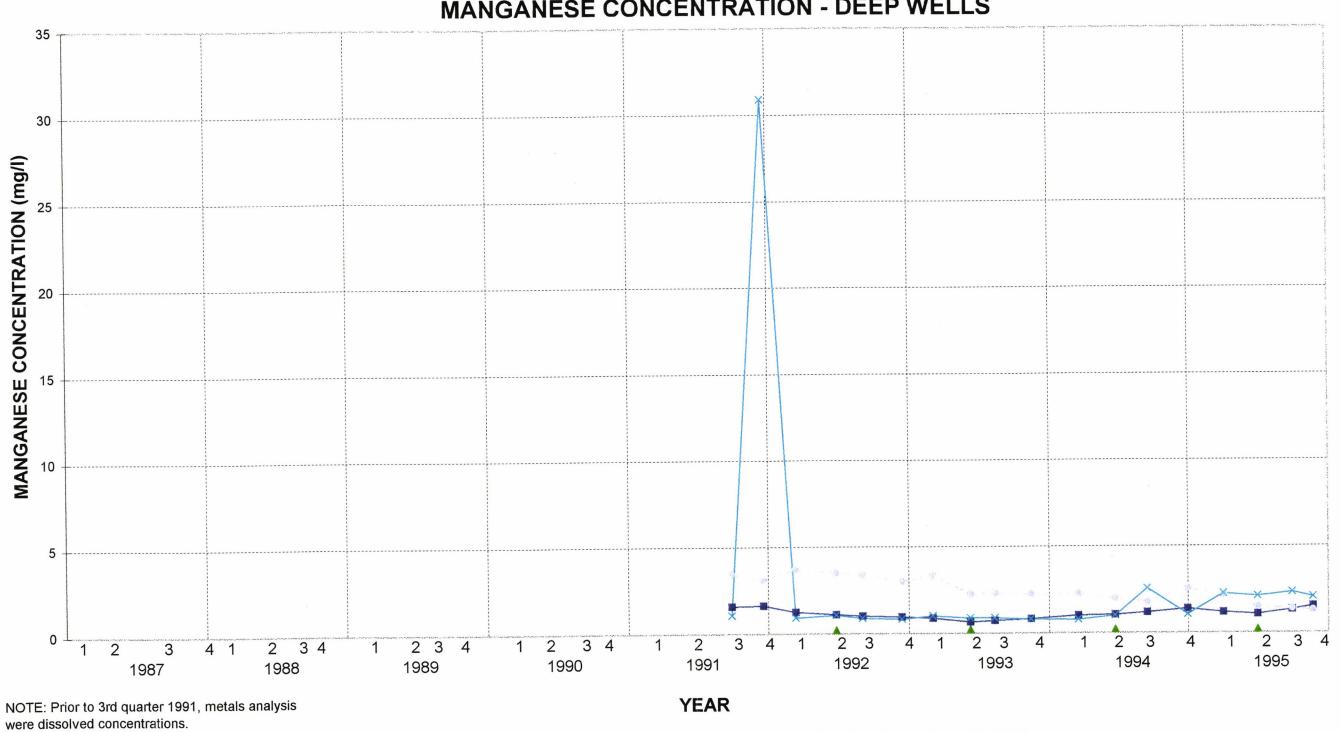
**CYANIDE CONCENTRATION - DEEP WELLS** 



**MANGANESE CONCENTRATION - SHALLOW WELLS** 



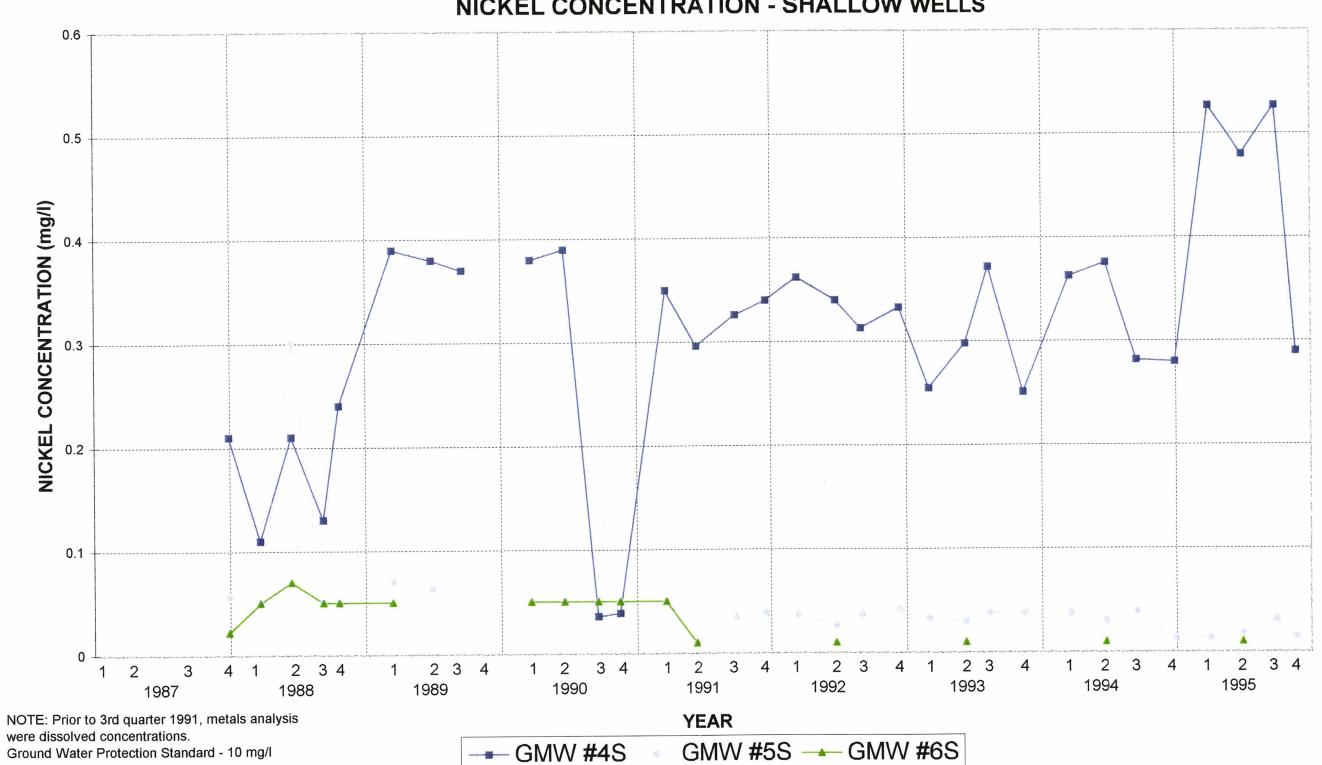
MANGANESE CONCENTRATION - DEEP WELLS



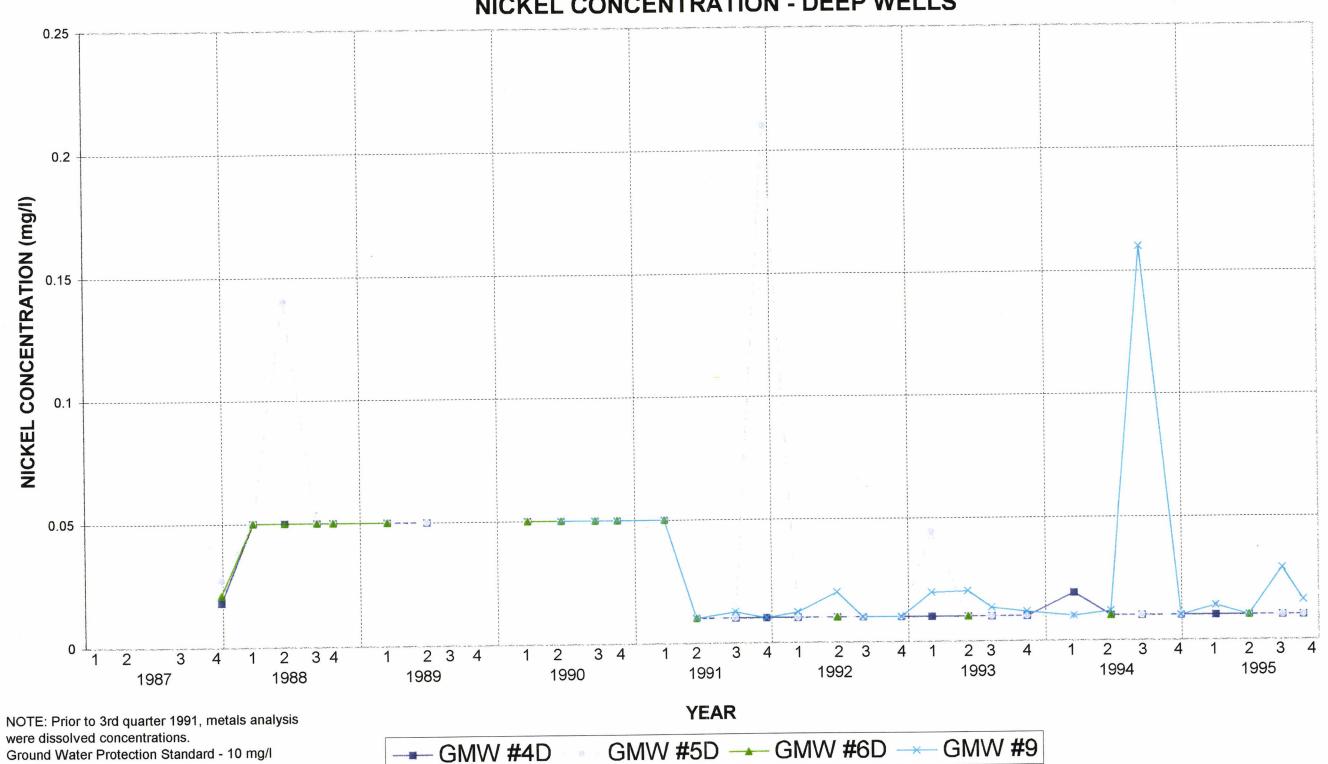
Ground Water Protection Standard - 114 mg/l

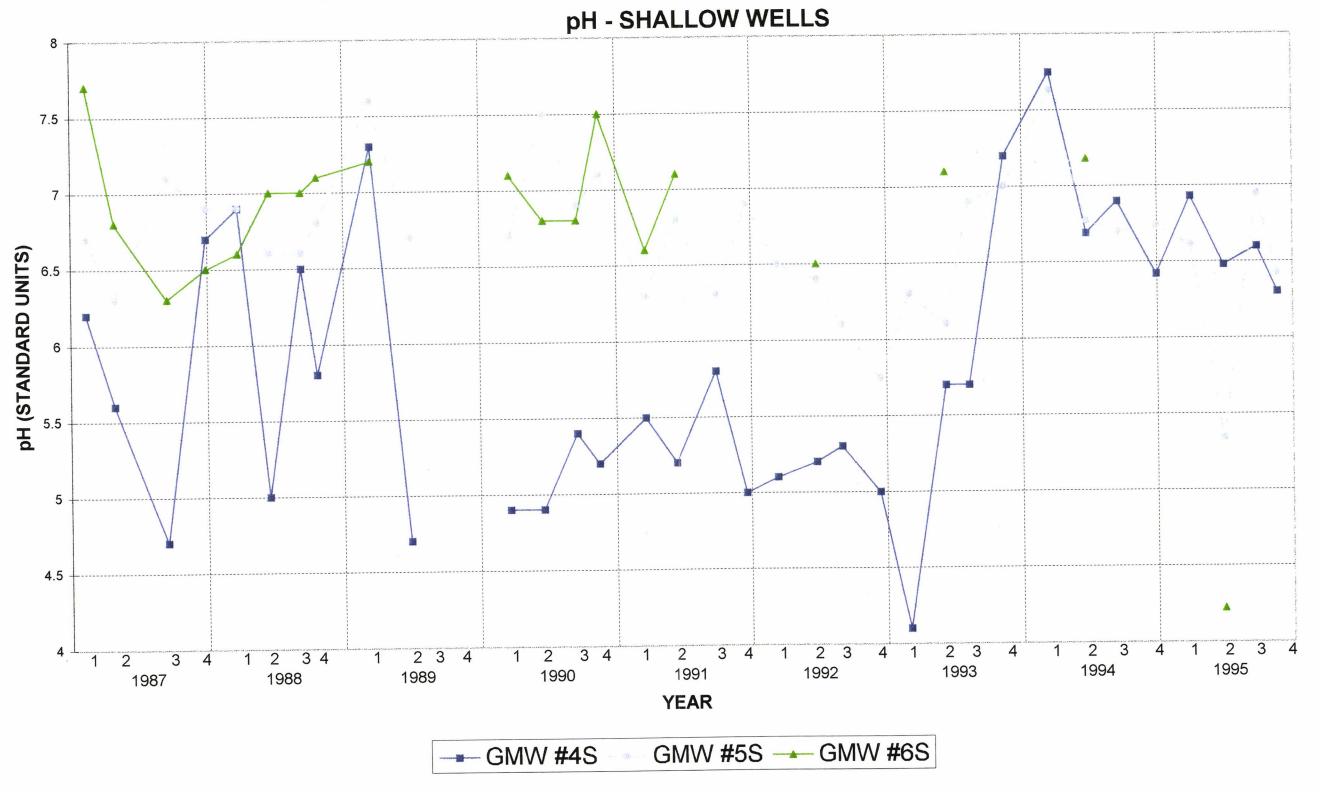
GMW#5D — GMW#6D — GMW#9 --- GMW#4D

**NICKEL CONCENTRATION - SHALLOW WELLS** 

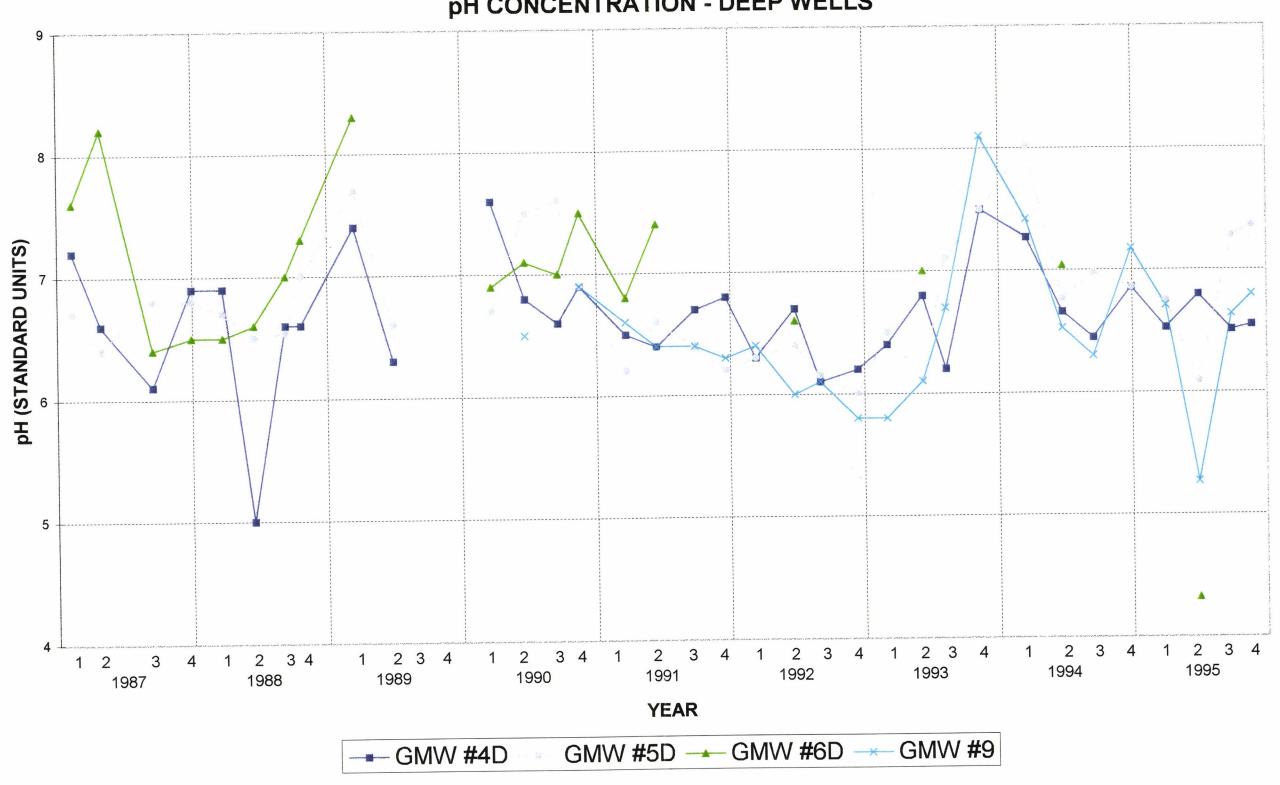


# INLAND REALTY - MARYVILLE, MISSOURI NICKEL CONCENTRATION - DEEP WELLS

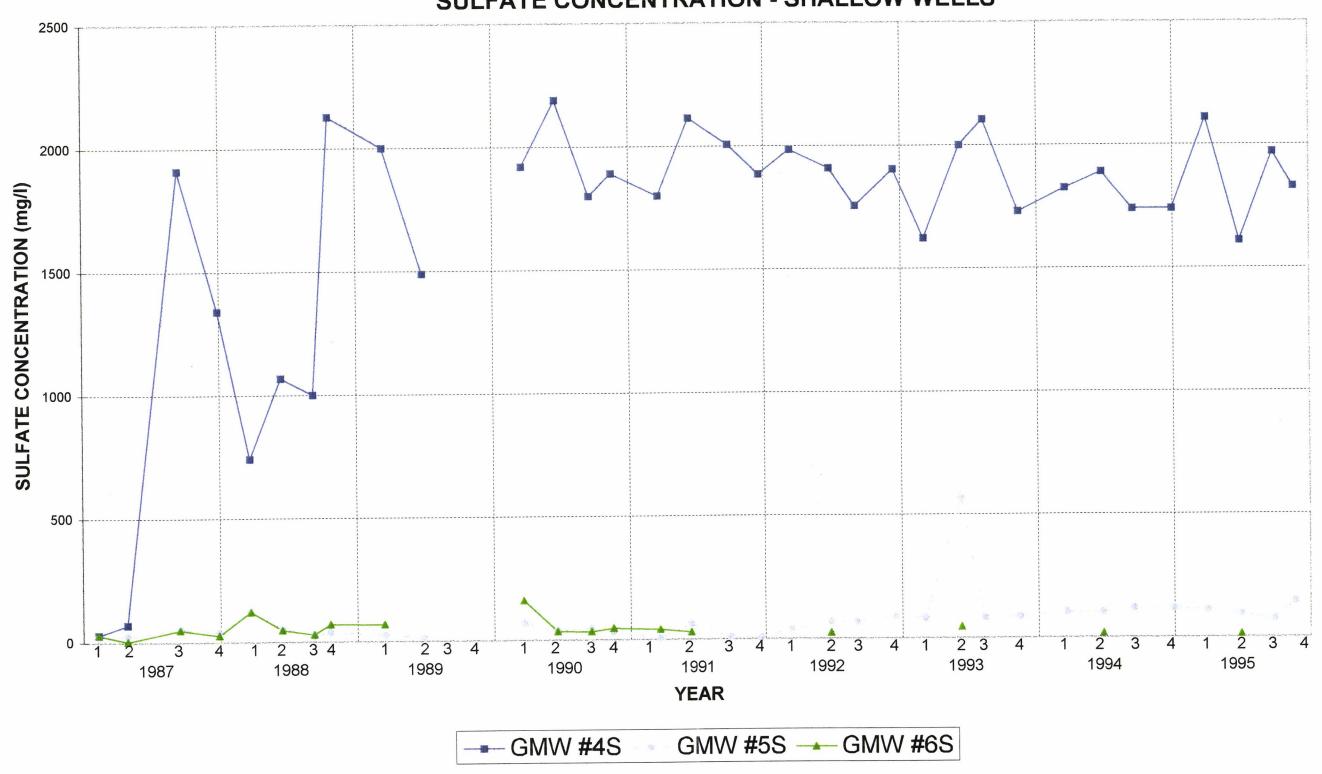




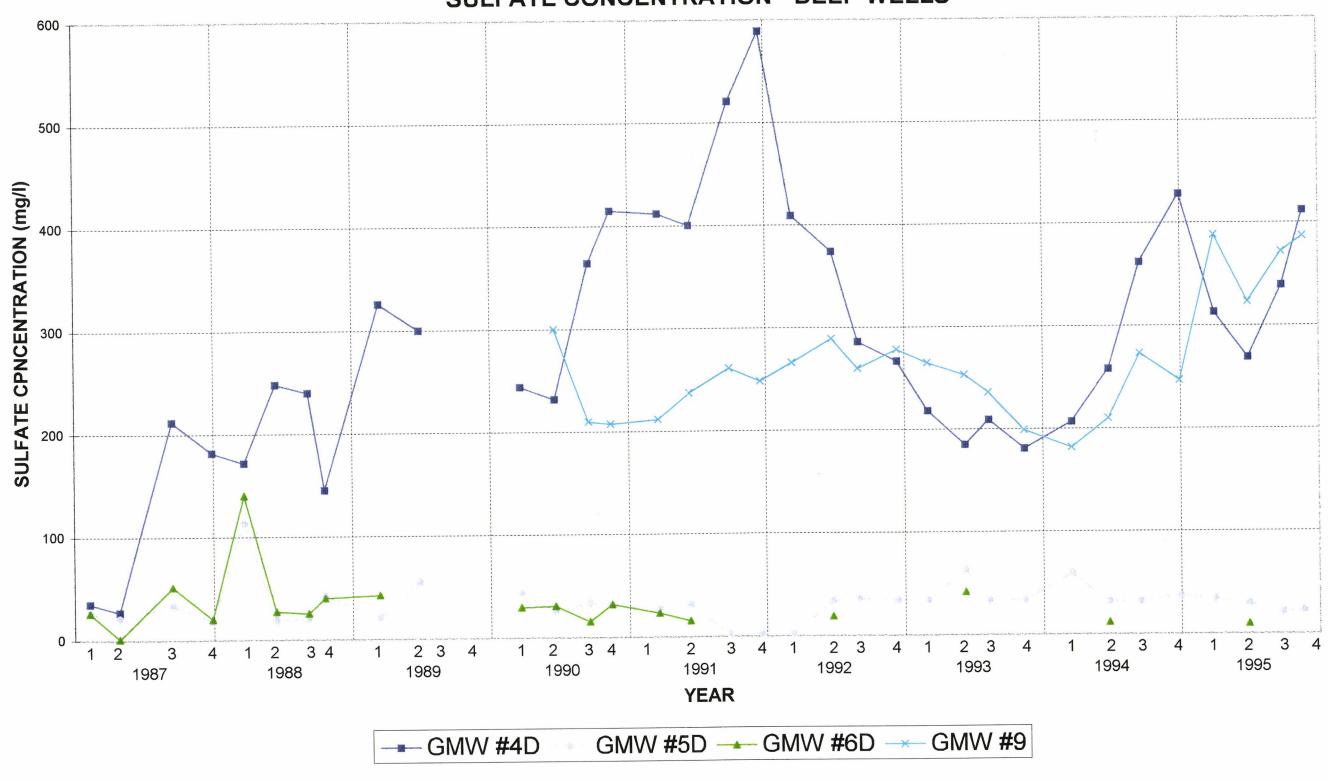
**pH CONCENTRATION - DEEP WELLS** 



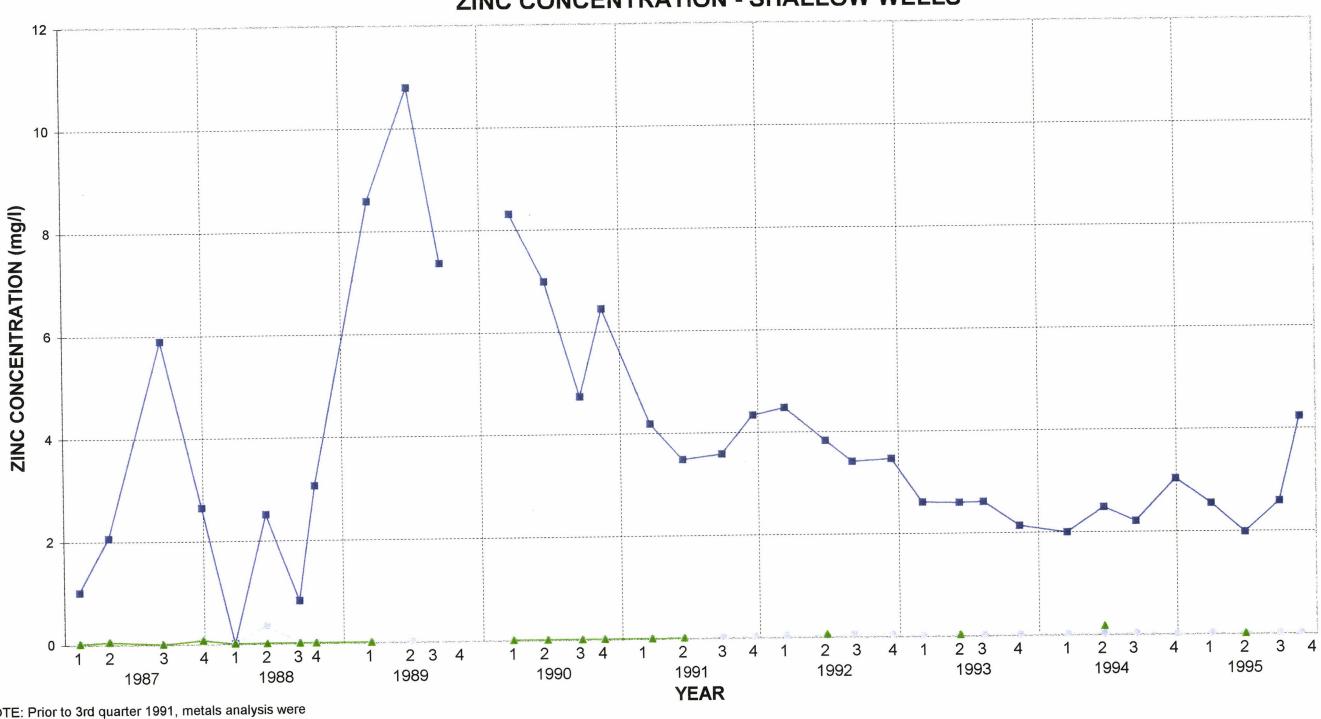
**SULFATE CONCENTRATION - SHALLOW WELLS** 







ZINC CONCENTRATION - SHALLOW WELLS



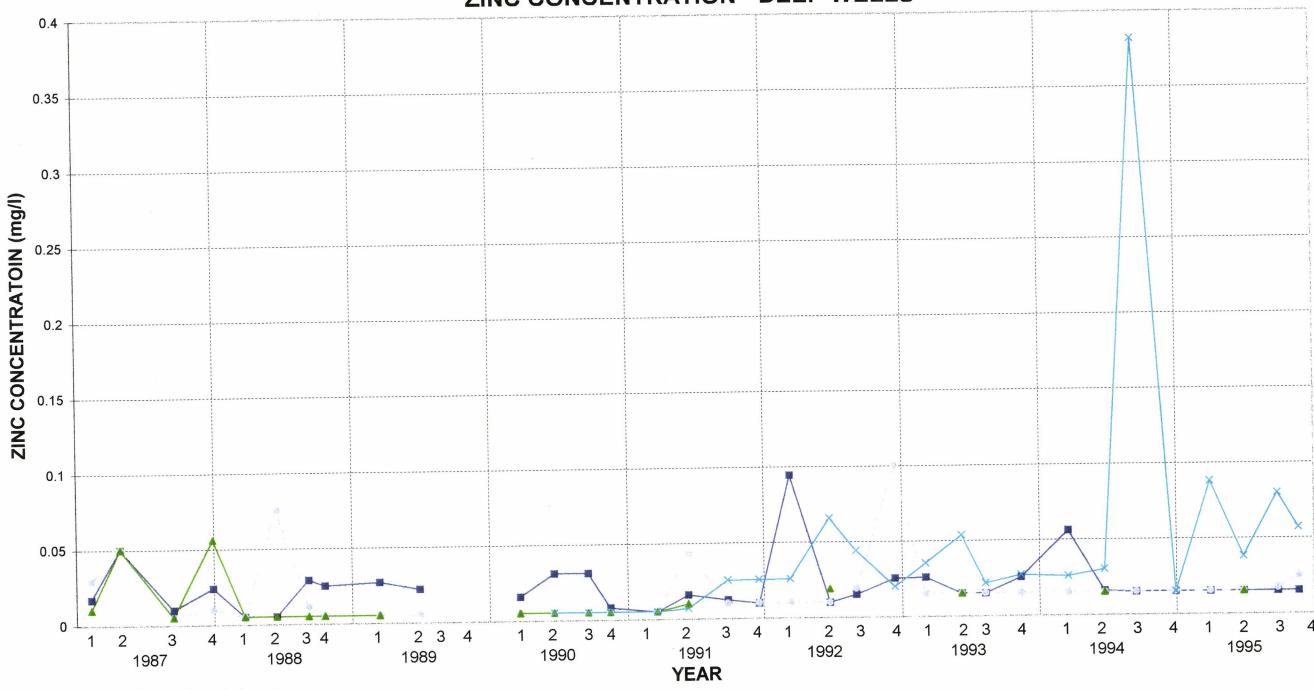
NOTE: Prior to 3rd quarter 1991, metals analysis were dissolved concentrations.

Ground Water Protection Standard - 1175 mg/l

-- GMW #4S

GMW #5S → GMW #6S





NOTE: Prior to 3rd quarter 1991, metals analysis were dissolved concentrations.
Ground Water Protection Standard - 1175 mg/l